Smart Computing
IN PLAIN ENGLISH
Learning Series

WINDOWS®

More Than 11 Million Sold! Guide/Learning Series

Super Guide

Tips & Tricks

To

TROUBLESHOOT, CUSTOMIZE & TWEAK

Windows 98 •NT•95•2000

Find The Right Windows For You

Conquer Error Messages

Make Windows Run Faster

Navigate The Registry Like A Pro

Plus: Windows Me Beta Testers Speak Out!

06>
7 25274 79746 2

$5.95
Vol. 6 Issue 6
$6.95 Canada

*Optional OnStar system includes one-year safety and security service contract. Call 1-800-ONSTAR-7 for system limitations and details. †Dependability based on longevity of 1981-1998 full-line light-duty truck company registrations. Excludes other GM divisions. Chevrolet and Blazer are registered trademarks and Chevy is a trademark of the GM Corp. OnStar is a registered trademark and the OnStar button is a trademark of the OnStar Corporation. ©2000 GM Corp. Buckle up, America! Call 1-800-950-0540.

A little security in an insecure world.

Safety. Security. Some things come down to pure instinct. Now Chevy Blazer has the optional OnStar driver assistance service.* With the touch of a button, an OnStar Advisor is always there to help you. Chevrolet, the most dependable, longest-lasting trucks on the road.† chevrolet.com

BLAZER

LIKE A ROCK

Receive A Free Trial Issue Of Smart Computing IN PLAIN ENGLISH

If you liked the informative tutorials and information in **this newsstand-only issue**, take advantage of this special **FREE TRIAL OFFER** and consider **subscribing** to our sister publication, *Smart Computing In Plain English.*

Smart Computing *Delivers Big Value.*

Each issue of ***Smart Computing In Plain English*** features step-by-step tutorials and how-to solutions to all your computing questions. Every article is written in **plain English** by the **same people** who brought you this issue. There's no technical jargon, so each explanation is easy to understand and apply. To find the hands-on solutions you've been looking for, take advantage of this special offer today.

Additional Benefits For Subscribers Include:

- As a subscriber to *Smart Computing In Plain English* you receive special pricing on all purchases of *Smart Computing Guide* and *Learning* issues, including all past, current, and future editions. Subscribers pay just $3.95 each, which includes delivery at **no additional charge**— a considerable savings from the regular price of $5.95 to $7.95 each.
- Free Online Access to the entire library of all *Smart Computing* publications.
- Membership to all *Smart Computing* Question & Answer boards and chat areas.
- Special pricing on other *Smart Computing* products, and much more.

Send For Your FREE TRIAL ISSUE Today.

Return The Postage-Paid Card Below And Receive Your FREE TRIAL ISSUE In About 14 Days

Risk-free! • Risk-free! • Risk-free! • Risk-free! • Risk-free!

Name

Company (if using business address)

Address

City/State/ZIP

Phone E-mail

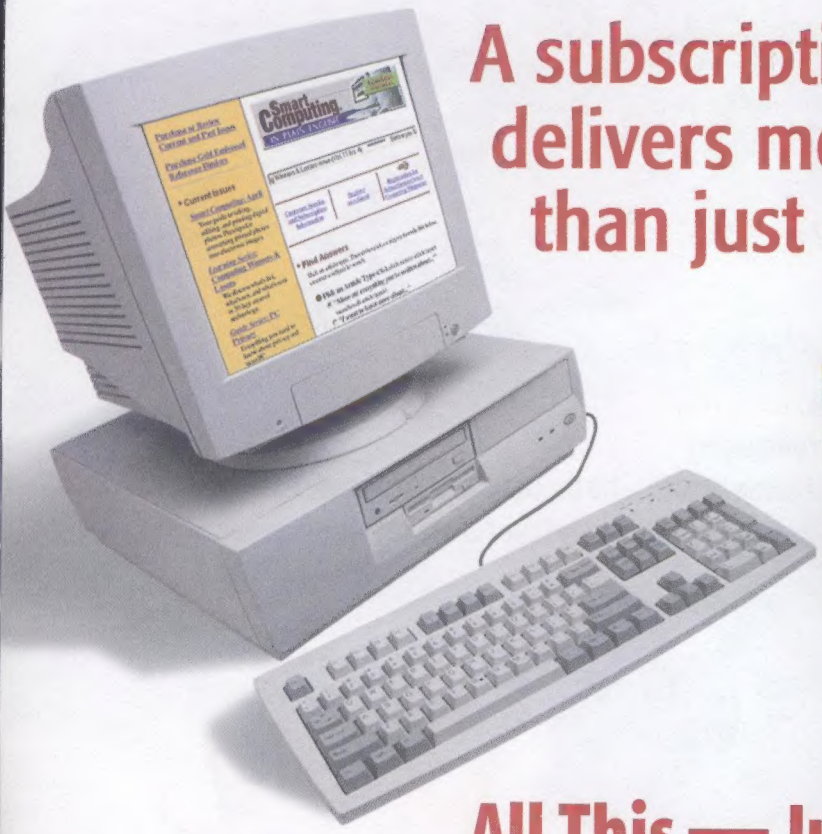
☐ Please send the next 12 monthly issues of ***Smart Computing*** for just $29 **(a savings of more than 50%)**. If I like *Smart Computing*, I'll pay the guaranteed lowest rate of just $29. However, if I decide *Smart Computing* isn't right for me, I'll **return** the invoice marked **"cancel,"** keep the **FREE TRIAL ISSUE,** and **OWE NOTHING.**

Canada $37 US Funds Includes GST #BN123482788RT0001
Outside US/Canada $59 In US Funds. Payment Must Be Included

Call-In Orders: (800) 733-3809
or Fax: (402) 479-2193

9805

A subscription to Smart Computing IN PLAIN ENGLISH delivers more than just a magazine!



All This — Just $29!

12 monthly issues delivered to your door — discounts on the purchase of all current, past, and future issues of *Smart Computing, Guide, Learning & Reference Series.* Plus FREE Online Access to the entire library of *Smart Computing* publications, membership to all Question & Answer boards, entry to the *Smart Computing* chat rooms, and much more.

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 10 LINCOLN, NE

POSTAGE WILL BE PAID BY ADDRESSEE:

SMART COMPUTING
P.O. BOX 85380
LINCOLN, NE 68501-9807

ORDER NOW

CALL
(800) 733-3809
FAX
(402) 479-2193

RISK-FREE

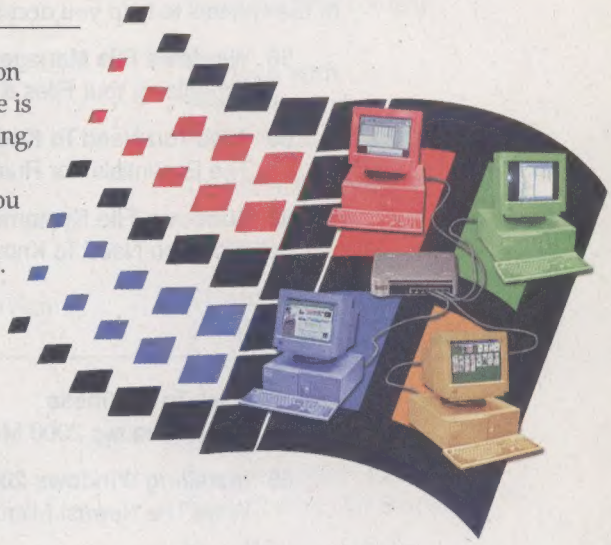
Windows® Super Guide

Smart Computing Learning Series Vol. 6 Issue 6

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corp. in the United States and/or other countries. The *Smart Computing Learning Series: Windows Super Guide* is not published in conjunction with Microsoft, nor has it been endorsed or sponsored by Microsoft. The use of the marks Microsoft and Windows in this publication does not represent participation in, or endorsement of, this publication by Microsoft.

MASTERING WINDOWS

5 Windows users take note: Do you use the Windows version best suited for your needs? Do you know everything there is to know about Windows hardware installations, networking, security, and upcoming versions of the operating system? If not, you'll find what you need in this section. Plus, if you need to reinstall Windows (or just in case you want to in the future), we walk you step by step through the process.



5 Windows Shopping
Find Out Which Microsoft System Is Right For You

8 What To Expect From Windows Me
Microsoft's Next OS Has Plenty To Offer Home & Small-Business Users

11 Windows Wonders
Answers To Some Of The Program's Most Frequently Asked Questions

16 Upgrade Fever
Tips To Perform & Troubleshoot Windows Hardware Installations

20 Make PCs Connect
Tips To Set Up & Troubleshoot Windows Networks

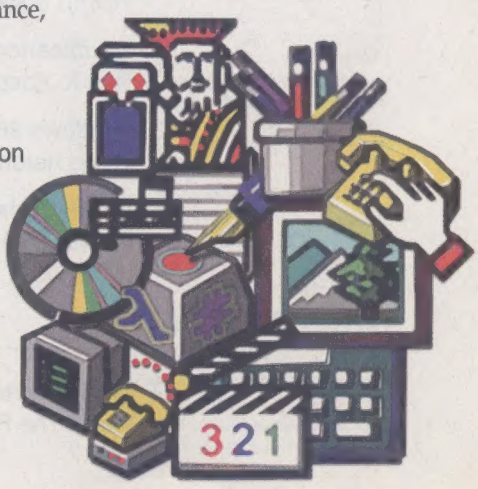
26 Windows Security
Measures To Protect Your PC

30 The Mobile Windows Picture
A Look At This Versatile System

34 Reinstallation Rundown
When & How To Reinstall Win95 & Win98

TIPS & TRICKS

38 Getting something for nothing is what this section is about. We show you ways to improve Windows installations, tweak system performance, navigate the Windows Registry, and get more out of the standard applications the operating system includes.



38 Ready, Set, Prepare
General Tips To Equip Your System For A Windows Installation

42 50 Ways To Speed Your Windows
Boost Performance & Minimize Work With These Tips

46 The Windows Registry
Making Sense Of Its Keys & Values, Then Using Them To Benefit You

49 Standard Applications
Tips For Using The Built-In Programs In Win95, Win98, WinNT & Win2000

WINDOWS FILES

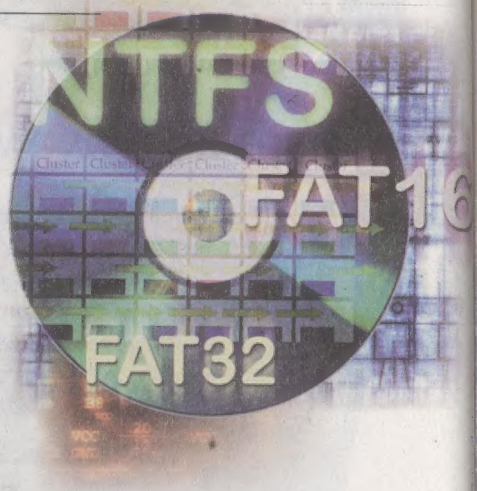
56

If you want to better manage your files and folders or decipher those mysterious files such as Autoexec.bat, Config.sys, System.ini, and others, here's all you need to know. Plus, we'll give you an overview of file systems to help you decide which is best for you.

56 Windows File Management
Organizing Your Files & Folders Into A Logical Sequence

60 Files You Need To Know
The Essentials For Running Legacy Programs

62 Windows File Systems
What You Need To Know About FAT16, FAT32 & NTFS



WINDOWS 2000

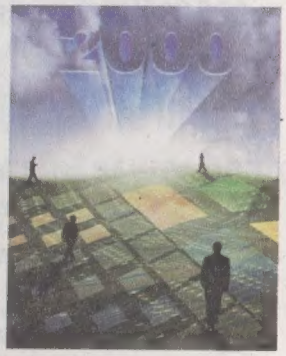
66

66 Back To Business
What Windows 2000 Means For You

69 Installing Windows 2000
What The Newest Microsoft System Needs

71 A Win2000 Walk-Through
Explore New, Industrial-Strength Features In This Windows Powerhouse

75 Troubleshoot Win2000
Tips To Determine The Source Of Your Problem



WINDOWS 98

78

78 Win98 System Requirements
Don't Let The Minimum Fool You

79 Win98 Secrets
Explore These Hidden Features & Tricks

82 Customize Win98
Putting The Pieces Into Place & Making Yourself At Home

85 Change The Win98 Registry
Understanding & Using The Power Behind Its Structure

87 Common Win98 Error Messages
Tips To Solve Your Windows Woes

90 Troubleshoot Win98
Tips To Keep Your OS Running Smoothly

93 Windows 98 Compatibility Problems & Solutions
When Hardware & Software Won't Work With Windows

95 Win98 Updates & Patches
Downloads Help This OS Stay Up-To-Date

WINDOWS 95

97

97 Win95 System Requirements
Watch The RAM & Disk Drive

98 **Win95 Secrets**
Tips For The Desktop, Taskbar & More

101 **Win95 Updates & Patches**
Where To Find Flaw Fixers & Performance Enhancers

WINDOWS NT

103

103 **WinNT System Requirements**
Your Knowledge Is As Critical As System Elements

104 **WinNT Secrets**
Find Tips To Help You With Everyday Tasks

107 **Customize WinNT**
Don't Let Your Systems Administrator Have All The Fun

110 **Change The WinNT Registry**
Getting To The Heart Of The OS

112 **Common WinNT Error Messages**
Understanding The Problem

115 **Troubleshoot WinNT**
Making Adjustments To Enhance
Your Operating System's Performance

118 **WinNT Compatibility Problems & Solutions**
Resolve FAT & Device Driver Issues

120 **WinNT Updates & Patches**
Create A Safer, More Efficient Operating System

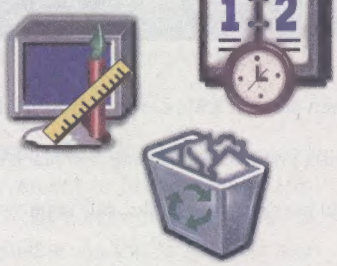
QUICK REFERENCE

122

If you've ever found yourself stumbling around your operating system, asking yourself, "How do I do this?" or "Where's that darn feature?," these articles are for you. We run down 24 of the most popular features and show you how to use them in Windows 2000, Windows NT, Windows 98, and Windows 95.

122 **Windows How-Tos**

132 **Working With Windows Components**



142 **GLOSSARY**
143 **INDEX**

Customer Service
customer.service@smartcomputing.com
Smart Computing
P.O. Box 85380
Lincoln, NE 68501-5308

Hours
Mon. - Fri.: 8 a.m. to 8 p.m. (CST)
Sat.: 8 a.m. to 4 p.m. (CST)

To Place An Order Or Change An Address
(800) 733-3809
FAX: (402) 479-2193

Subscription Renewals
(800) 424-7900
FAX: (402) 479-2193
http://www.smartcomputing.com

Authorization For Reprints
(800) 334-7458
FAX: (402) 479-2104

Editorial Staff
editor@smartcomputing.com
FAX: (402) 479-2104
131 W. Grand Drive
Lincoln, NE 68521

Advertising Staff
(800) 848-1478
120 W. Harvest Dr.
Lincoln, NE 68521
FAX: (402) 479-2193

The Audit Bureau Member

Sandhills PUBLISHING

PRINTED WITH SOY INK

Web Only

You can find the following articles at the *Smart Computing* Web site, **http://www.smartcomputing.com**. Access the articles from this issue's table of contents.

Working With File Extensions
Three Magic Little Letters

Customize Win95
Tailor Your OS To Fit Your Needs

Change The Win95 Registry
Let This Robust Resource Work For You

Common Win95 Error Messages
Free Your Data From Risk By Following Our Guidelines

Troubleshoot Win95
Fix Common Frustrations With Our Simple Tips

Win95 Compatibility Problems & Solutions
Use The Web To Find Products That Work With Your OS

Editorial Staff: Ronald D. Kobler / Trevor Meers / Samit G. Choudhuri / Corey Russman / Kimberly Fitzke / Michelle Cameron / Dan Spellerberg / Katie Dolan / Eileen De Mott Curtright / Jennie Schlueter / Raejean Tupa / Michael Sweet / Buffy Cranford-Petelle / Christopher Trumble / Blaine Flamig / Marty Sems / Chad Denton / Lori Robison / Michelle Nelson **Customer Service:** Theresa Sissel / Nicole Buckendahl **Subscription Renewals:** Liz Kohout / Connie Beatty / James Berger / Matt Bolling / Patrick Kean / Charmaine Vondra / Miden Ebert / David Vapenik / Kathy DeCoito **Art & Design:** Lesa Scarborough / ReBecca M. Toof / Fred Schneider / Ginger Riley / Carrie Emmons / Dave Fiala / Lori Garris / Jason Codr / Jim Mehsling / Bret Jurgens / Andria Schultz / Dawn Wickett **Circulation Development:** Debbie Butt / Kelly Richardson / Mark Anderson / Bart Stephens **Newsstand:** Mark Peery / Garth Lienemann / Robb Knigge **Advertising Sales:** Grant Ossenkop

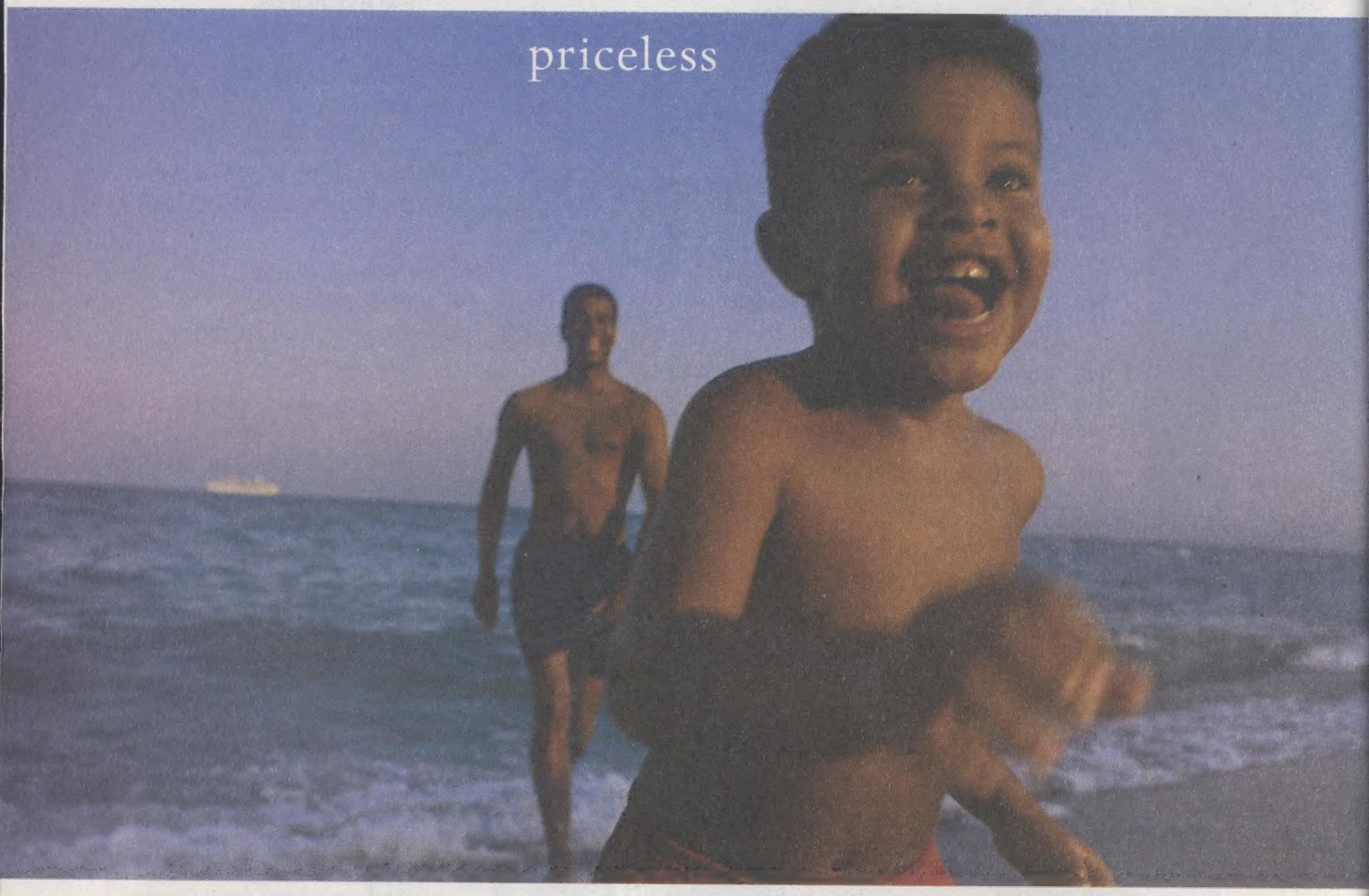
Copyright 2000 by Sandhills Publishing Company. All rights reserved. Reproduction of material appearing in *SMART COMPUTING LEARNING SERIES: Windows Super Guide* is strictly prohibited without written permission. Printed in the U.S.A. GST # 123482788RT0001.
Smart Computing is published monthly by Sandhills Publishing Company. 131 West Grand Drive, P.O. Box 85380, Lincoln, NE 68501. POSTMASTER: Send address changes to *Smart Computing*, P.O. Box 85380, Lincoln, NE 68501.

small business association dues: $450

payroll & accounting software: $760

office supplies: $150

remembering who you work for:



When you get a MasterCard BusinessCard® with MasterCard Business Bonuses,™* you'll earn miles good on any airline. No blackouts. For details and participating banks, call 1-800-788-1365.

there are some things money can't buy.
for everything else there's MasterCard.™

www.mastercard.com

©1999 MasterCard International Incorporated

*Only available through participating banks. Certain restrictions and limitations apply.

Windows Shopping

Find Out Which Microsoft System Is Right For You

Like it or not, Windows is probably the best operating system for you. Most software runs on it, and most hardware runs with it. But the question remains, "Which Windows?"

Take a survey of the computers you see running at the homes of friends, at businesses around town, at schools, and in stores, and you'll likely find everything from ol' Windows 3.1 all the way up to the brand-spanking-new Windows 2000. Your own starting point helps determine which direction to turn.

For example, many home or business users still staring at the outdated interfaces of Windows 3.x or Windows NT 3.x could dramatically improve their computer experience by upgrading to newer Microsoft models. The only hitch is that most computers running an OS (operating system) from the version 3 days probably don't have the hardware necessary to power more advanced software. In other words, choosing a different Windows also may mean you have to find a different computer.

Users already running Windows 95, Windows 98, or WinNT 4 may not have the latest and greatest operating system—we'll look at the pros and cons of upgrading to Win2000 later—but there's probably life in those Windows yet. If you're starting from scratch with a newer machine, you'll probably be shopping for Windows 98 Second Edition, different versions of WinNT 4, or the new Win2000 lineup.

One option not discussed in this article is holding out for yet another version of Windows, such as Windows Millennium Edition (see sidebar). Take a look at "What To Expect From Windows Me" in this issue for more information on Windows Me and to decide if it's worth the wait.

Key Points

- Win95 and Win98 are primarily for home users.
- Windows NT and Win2000 mean business, but even consumers will appreciate 2000's stability.
- If you still run Win95, consider upgrading.

■ **Windows 95.** Win95 represented a major improvement in Microsoft's lineup, surpassing the old Win3.x in just about every way imaginable. As the 95 moniker suggests, however, the OS is starting to show some age in a business where progress is measured in weeks and months rather than years.

Win95 has not stood still, of course, and with a little work the OS can sport many of the features found in later Windows versions. A visit to the download page at the Microsoft Web site (http://www.microsoft.com/windows95) lets you outfit Win95 to support USB (Universal Serial Bus) devices, fix it up with the latest Internet Explorer Web browser, add support for new hardware, and tack on dozens of other doodads. What's more, the interface itself—the most important and visible feature to many users—is only slightly different from that seen in the recently released Win2000.

Deciding whether to stay with yesterday's Windows means adding up the advantages of switching and comparing them to the price tag. Microsoft pushes home users to try out Win98 SE, the improved version of Win98, and touts Win2000's abilities for businesses. However, if Win95 already works well for you either at home or in the office, there's no earth-shattering reason to spend upgrade money unless you're just the kind of person who likes the subtle improvements a new OS brings.

On the other hand, two groups of users should seriously consider ditching 95. First, home or small-business users trying to share Internet access among several computers through a single cable or DSL (Digital Subscriber Line) modem will welcome Internet Connection Sharing in Win98 SE or the similar connection-sharing tools in Win2000. Combined with a relatively small hardware investment, the connection sharing built in to Win98 SE and Win2000 makes hooking up to the Internet a snap.

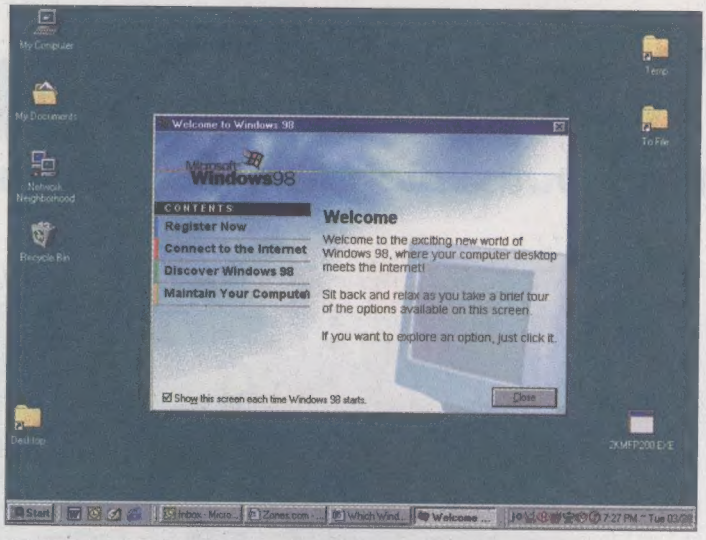
Second, business users or home users with critical applications will be amazed by the relative stability of WinNT and especially Win2000 over both Win95 and Win98. If crashes cost you time and lose your data, read below to see if your hardware has what WinNT and Win2000 desire.

■ **Windows 98 Second Edition.** What Win95 does, Win98 does just a little bit better. The actual differences between 95 and 98 may seem small to many users, and for the most part they are. Win98 comes in a couple of flavors—the original 98 and Win98 Second Edition, or SE. While a Win98 user can upgrade to SE for $19.95, most of the SE enhancements are available as free downloads from the Microsoft Web

site. The major exception is Internet Connection Sharing (mentioned above), which could be reason enough to make the switch.

Most new computers today come equipped with Win98 SE. For most people, it's not a bad choice. Because it is the standard OS for general consumer use, manufacturers design the vast majority of new hardware and software with Win98 in mind. Win98 SE supports the USB standard right out of the box for quick connections to new peripherals. The Internet Connection Sharing feature makes a lot of sense for the growing number of homes with multiple computers. Win98 also comes loaded with graphic support for the latest computer games, a Maintenance Wizard to streamline hard drive chores, and the FAT32 file allocation system to make better use of hard drive space.

What the whole Windows 95/98 (Win9x) line does not do well is remain up and running for long periods of time. In fact, some days it seems as if the OS even has trouble running for short periods of time. While Win98 is an improvement over Win95, it still lacks the stability required to establish a level of trust with your computer. Businesses and users who need to rely on their computer's ability not to freeze up at a crucial moment may want to steer clear of Win98 if they have a choice and consider upgrading to NT or 2000 if Win98 is already loaded.


Welcome to Windows 98
Windows98
CONTENTS
Register Now
Connect to the Internet
Discover Windows 98
Maintain Your Computer
Welcome
Welcome to the exciting new world of Windows 98, where your computer desktop meets the Internet!
Sit back and relax as you take a brief tour of the options available on this screen.
If you want to explore an option, just click it.
Show this screen each time Windows 98 starts.
Close

Win98 Second Edition, the champ of the home market, still makes sense for many consumers. However, users with up-to-date hardware may consider Win2000's more advanced foundation or wait for Windows Me.

■ Windows NT 4.0. With WinNT 4, Microsoft brought its business OS line into the modern world of the Win95-style user interface. On the surface, it's difficult to immediately distinguish between NT and its Win9x cousins. Under the hood, the situation is different. Unlike Win9x, WinNT cannot run every DOS program, consumer-oriented peripheral, or other legacy application. While NT is not compatible with all Win9x software and hardware, it suffers from significantly fewer crashes.

NT also includes a host of features designed to keep business networks secure and easy to administer. Large corporations with hundreds or even thousands of desktops consider these security and administration tools imperative.

Users who have NT on a standalone machine or small network won't be using all the gizmos designed into the OS, but that's no reason by itself to switch back over to Win9x. NT can be more difficult to operate than the consumer-oriented Win98—even the simple task of updating a hardware driver takes some patience—but advantages such as solid operation can outweigh the occasional need to track down a well-worn how-to guide.

If you're setting up clean computers and choosing an OS from scratch, however, NT probably isn't the answer. While it's true the longstanding Microsoft business standard should have all of its bugs zapped by now, NT lacks decent support for important new standards such as USB and features designed to take advantage of the Internet. An eventual migration to Win2000 is inevitable, and costs incurred in updating Win2000 with subsequent bug fixes are likely to be less than upgrading everything from NT to 2000 later.

■ Windows 2000. Win2000, the latest addition to the Microsoft pantheon, brings NT into the new century. Win2000, which is meant primarily for businesses small and large, comes in three versions.

Choose Your Windows

With all the varieties of Windows available today, choosing what will run on your machine is a bit of a challenge.

Version	Intended Market	Advantages	Disadvantages	Approximate Street Price
Windows 95	*Home users*	*Better than its predecessors, but showing its age as the oldest of the Win9x line*	*Frequent reboots*	*$90 upgrade*
Windows 98 SE	*Home users*	*Update to Win95 runs a bit faster and includes a slew of new gadgets*	*Mostly cosmetic enhancements over 95; didn't substantially improve stability*	*$180 full version; $90 upgrade*
Windows NT 4 Workstation	*Corporate desktops*	*More stable and secure than Win9x with the same basic interface*	*Poor USB support; lacks notebook features; complex to operate*	*$280 full version; $130 upgrade*
Windows 2000 Professional	*Corporate desktops and notebooks; small businesses*	*Faster than NT; surprisingly stable; USB and notebook features*	*Some areas still more technical than in Win9x; requires newer hardware to run properly*	*$280 full version; $199 upgrade ($129 with manufacturer rebate at press time)*

Windows 2000 Professional (available for about $280 new; $190 upgrade from NT) is the basic NT 4 upgrade meant for corporate desktops and notebooks. Windows 2000 Server ($800 new; $400 upgrade from NT Server) adds file and print sharing and is meant to form the hub of a department or small network. Windows 2000 Advanced Server ($3,300 new; $1,700 upgrade from NT Server) scales up to handle large networks and e-commerce sites.

Win2000 builds on the stability of NT, adds many of the advanced features until now seen only in Win98, and throws in some new tricks to boot. Win2000 supports USB, for example, and includes Internet Connection Sharing for small networks. A new Encrypting File System can encode every file on your hard drive to make sensitive data useless to hackers. The Windows File Protection system keeps track of critical system files and restores them if a misbehaving program or setup routine overwrites a newer file with an older version. Additional features for notebooks make computing on the go better than ever. Assuming you have more than 64MB (megabytes) of RAM (random-access memory), Win2000 also runs noticeably faster than Win98.

It all sounds great, so why wouldn't everyone want to run Win2000? There are a few downsides. First, the new OS, like all new Windows before it, raises the bar for minimum necessary hardware. Don't pay attention to the almost laughable configuration listed on the side of the box. A more realistic set of minimum requirements for Win2000 includes a 266MHz (megahertz) Pentium MMX or better CPU (central processing unit), 64MB to 96MB of RAM or more, and a 4GB (gigabyte) hard drive with 1.5GB of free space.

Second, Win2000 costs more than Win98. If you're already running some version of Windows, the upgrade price for Win2000 can be competitive. If you're in the market for a full version, however, the newer OS will set you back about $100 more than Win98 SE.

Win2000 also is a bit more complex than Win9x. Home users considering an upgrade should know that not every feature operates the same as it does in their old OS, and you may need to brush up on the new system to make everything work. Experienced users shouldn't have many problems, but novices might run up a few blind alleys on the way to Windows bliss.

Perhaps the biggest drawback is that Win2000 simply doesn't yet support all of the hardware and software it's likely to encounter out in the real world. While most manufacturers are busy introducing Win2000-compatible drivers, some equipment even of surprisingly recent vintage might never work with the new OS. It's also possible that hastily written new drivers can lack useful features found in the original, more advanced drivers. Especially nasty trouble can crop up on a relatively older computer with a Win2000-incompatible BIOS (Basic Input/Output System). Users should make sure this critical component is up-to-date before beginning installation.

Microsoft tries to head off these conundrums with a Readiness Analyzer that potential Win2000 users can download from the company's Web site at http://www.microsoft.com/windows2000/downloads/deployment/readiness/default.asp. The Analyzer searches your computer for hardware and software not known to work with Win2000 and provides a useful report that can alert you to potential problems. Before spending the money on Win2000, run the Analyzer. Check the manufacturer Web sites of components that might cause problems, then make an informed decision.

Win2000, which is practically indistinguishable from Win98 on the surface, uses WinNT's far more stable code.

Bottom Line. Which Windows to recommend for a particular situation comes down to a question of hardware. Older machines with slower CPUs and modest memory would be better off sticking to Windows 9x. Computers with the speed Win2000 demands will run better with the new operating system and experience far fewer crashes. And the tremendous reduction in aggravation from Blue Screens of Death handily outweighs the occasional aggravation involved with figuring out how to do a task in a new OS. Win2000's only disadvantages are the extra cost and the potential for existing peripherals to get lost in the compatibility shuffle. If you're still undecided, see "What To Expect From Windows Me" in this issue for a look at Microsoft's upcoming Windows Me. LS

by Alan Phelps

What's Next For Windows

Deciding which Windows to use isn't going to get much easier—at least for a while.

Despite the obvious advantages of Windows 2000 in terms of stability, Microsoft plans to extend the life of the Windows 95/98 (Win9x) line later this year in the form of Windows Millennium Edition. Based on Windows 98, Millennium Edition (formally known as Windows Me) will be aimed at consumers and positioned as an upgrade to the popular home OS. (For more information on Windows Me, see "What To Expect From Windows Me"). Business customers will continue to be steered toward the incarnations of Win2000.

Microsoft originally planned another round of dual upgrades following up both OS (operating system) lines. "Neptune" would have replaced Millennium, while "Odyssey" would have been the next NT-based successor to Win2000. However, the new plan is to release a combined OS, code-named "Whistler," in spring 2001. Whistler will be based on NT code, presumably with features to make it a bit more user-friendly for the home crowds of Christmas 2001.

A more substantial upgrade, code-named "Blackcomb," is hot on Whistler's heels. Microsoft is tight-lipped about Blackcomb at this point, and it won't release the operating system until 2002 at the earliest. □

What To Expect From Windows Me

Microsoft's Next OS Has Plenty To Offer Home & Small-Business Users

You knew it was coming. Every few years, Microsoft rolls out another operating system aimed at home users, forcing all of us to go through the usual process of deciding whether we want to shell out the cash to upgrade or stay behind the times with the operating system we bought two years ago.

This year the decision for most people will be whether to stick with Windows 98 (or Windows 95) or move up to the latest OS (operating system) on the block, Windows Me (Millennium Edition). Microsoft repeatedly assured the world that Win98 would be the last operating system to include DOS, and rumors persisted that Microsoft would base the next consumer version of Windows on Windows 2000. But Windows Me will support DOS, and it shares the same code base as Win98, which was an incremental upgrade of the Win95 OS.

There has been talk that Windows Me may not be available for purchase as a standalone product and instead will ship as an OEM (original equipment manufacturer) option that will only ship preinstalled on new PCs. This is the strategy Microsoft took with the OSR2 release of Win95. We'll have to wait for final release to see what availability strategy Microsoft takes.

To give you some idea of whether the upgrade is worth it when Microsoft releases the final code, let's take a look at some of the features of the new OS. Microsoft could not provide us with a Beta 2 copy of Windows Me, as Beta 3 was slated for release shortly after this story went to press. The company did release a list of features supported by the Windows Me Beta 2 that details the major changes computer users can expect from the new OS. These changes fall into one of following four broad categories: PC Health, Digital Media And Entertainment, Online Experience, and Home Networking.

Key Points

- Windows Me bundles several new features, including a streamlined boot process and AutoUpdate.
- Me is a good choice for home users and gamers.

We've broken down the feature list and included our thoughts on how users can potentially use and benefit from each. Note that Microsoft likely will add to this list (and change some things) in the Beta 3 release and make even more adjustments to the final code that is due on PCs by the time you read this.

■ **PC Health.** Windows Me should be more stable and easier to troubleshoot than previous Windows OSes. The goal here is to create a consumer operating system that is easy to work with, and if it works out, it could mean users will lose less work and have less computer downtime than was the case in the past. The Windows Me Beta 2 included 12 feature updates in the PC Health category, in addition to the overall stability improvements the newer code should provide. We aren't going to discuss all of them, just those we feel will be useful to typical users.

Booting into high gear. Nobody likes to wait for Windows to boot, and although "instant-on" technology on a desktop PC is a long way off, Microsoft has streamlined the boot process to shave off a few interminable minutes. Microsoft cut a lot of boot time by eliminating real-mode DOS startup routines from the initial boot procedure. Past versions of Windows always went through the DOS rigmarole before loading the Windows OS.

Some have interpreted this change as a lack of DOS support in Windows Me, since Win2000 has no DOS support. This is not true, as you can still launch DOS applications from within Windows. That's not to say all DOS applications will work in Windows Me as well as they did in Windows 95/98 (Win9x), but Me should retain most DOS functionality.

Suspended animation. PCs that support advanced power management technology will benefit from Windows Me's improved hibernate and resume features. Many notebook users are familiar with these utilities, which let users start the computer relatively quickly after you shut it down.

The technology works by saving the computer's RAM (random-access memory) contents to the hard drive and then shutting off the computer. When the computer is turned on, it can bypass the majority of the startup procedures and restore the computer to the exact state it was in when the hibernate feature was activated. If you were in the middle of typing a sentence in Word when hibernate was used, you'll be right back where you left off when the computer is

Waiting For Whistler?

Microsoft has been promising for years to release a consumer operating system that finally shed its DOS roots, but it obviously has not followed through on that promise with Windows Me. Instead, we have to wait for Whistler, the top-secret consumer operating system based on Win2000. Whistler code that was under wraps was leaked to the Internet in March, but we still know little about its focus, capabilities, or final release date (which was once slated as spring 2001).

Since Windows Me is such an incremental upgrade to the Windows 95/98 family, you may feel like waiting for the release of Whistler before upgrading. The advice from everyone we spoke with was don't. The new operating system might not appear for years, and you'll only miss all sorts of goodies in the interim. □

turned on. You don't even have to launch Word, since it was running (and in RAM) when the system went into hibernation.

New hardware support and ACPI. Plug and Play in Win98 was good, and the technology should be much more mature in Windows Me. The new OS recognizes a lot more hardware than Win98 can, and it will feature native support for a variety of upcoming devices, including the five-button mouse.

Windows Me also ushers in the age of ACPI (Advanced Configuration and Power Interface), which lets the operating system dictate how much power it should allocate to installed hardware components. If a modem is not in use, for example, the ACPI could disconnect the power to it to save electricity.

System file protection. Nearly every Windows user has experienced a problem with an application that was attributable to a corrupt or outdated system file. Many times this happens because the correct system file inadvertently was copied over during a program installation or because it wasn't removed properly when the updated system file was installed. Microsoft promises that the system file protection technology built into Windows Me will eliminate many of these errors, leading to enhanced stability and easier troubleshooting.

AutoUpdate. It's nearly impossible to keep up-to-date with all the new drivers and software patches, but Microsoft hopes to automate this chore with Windows Me's AutoUpdate tool. The utility comes to life whenever a user has an active modem connection. It scans Microsoft's database to see if any updates are available that apply to you and automatically downloads them. The downloads only take place when users are not actively using the modem, and as soon as AutoUpdate detects user activity, it suspends the downloads. In other words, you won't have to wait a long time to load a Web page because AutoUpdate has a stranglehold on your Internet connection.

Get more help. Everyone seems to like Windows Me's all-new Help files. All of the Help documentation is in **HTML (Hypertext Markup Language**, the language of the Web) format, accessible from a much more user-friendly interface than that found in Win98. A new Help Center aggregates Help documents from Microsoft and other companies, including hardware manufacturers, with the ultimate goal being the creation of a central location containing answers to all PC-related questions.

The new System Restore technology is another much-needed tool that has been lumped into the Help category. If, for example, you install software that messes up the computer or leaves a virus, System Restore lets you take the system back to the configuration you had before you installed the software. This utility comes with other advanced features that have the potential to eradicate catastrophic software failures.

■ **Digital Media & Entertainment.** Microsoft has always fine-tuned its consumer operating systems for superb multimedia performance, and Windows Me is no exception. This time around, the focus is on pictures—a fitting choice, considering how many people are swapping electronic photos these days. New WIA (Windows Image Acquisition) architecture makes downloading files from a digital imaging device to the PC much easier. Microsoft claims WIA devices will support other advanced features, letting users edit photos on the imaging device before going to the PC and providing picture management tools for organizing, previewing, and storing pictures with ease.

Microsoft still includes the paltry selection of games previous versions of Windows shipped with (such as Solitaire and Minesweeper), but Microsoft augmented the basic games with several online games such as chess, checkers, backgammon, and hearts. Microsoft also upgraded its CD player by adding Internet support for downloading CD information and a snazzy new interface to access the enhanced features.

Make Room For Me

All the new features discussed in this article have made Windows Me into one of the most bloated operating systems Microsoft ever designed. This means system requirements are likely higher than those specified for Win98, and the hard drive installation size is enormous. Windows Me's Readme file for Beta 2 states the operating system needs 275MB (megabytes) to 385MB of hard drive space for a typical installation, or a whopping 480MB for a full installation.

Those figures apply only to those users who have hard drives formatted with the efficient FAT32 (32-bit file allocation table) technology. Those with FAT16 drives (the standard for Win95) will need up to 515MB of room just for the operating system. If you have an older system (anything with less than a speedy Pentium II processor and 64MB of RAM [random-access memory]), you may want to stick with the operating system you currently use until you upgrade your computer.

Steep as those hard drive requirements are, Win2000 is even more bloated. The manual for that product lists 650MB as a minimum install, but it is possible to use two or three gigabytes for a full install. This may make Windows Me a more attractive upgrade for small businesses with aging hardware. □

Online Experience. Microsoft listed only two improvements in this area for the Beta 2 release: streamlined Internet connections and enhanced Internet printing capabilities. The faster and more stable Internet connections should come courtesy of an improved TCP/IP (Transmission Control Protocol/Internet Protocol) stack. TCP/IP is the lingua franca of the Web, and adjustments to the TCP/IP stack can have a profound impact on Internet performance. The new Internet Printing features will let users preview their Web printouts and resize documents so they fit within the borders of a standard printed page.

Home Networking. Broadband services such as DSL (Digital Subscriber Line) and cable modem should be widely available in the next few years, and Microsoft is designing Windows Me to let users with multiple computers take advantage of the higher connection speeds. DSL and cable modem are so fast compared to a standard 56Kbps (kilobits per second) modem connection that there is plenty of leftover bandwidth for another PC, but it currently is difficult to share the connection without having an advanced engineering degree.

Windows Me promises to change all that with its advanced home networking support. Most people think of home networks as two or more PCs that can share files, but Windows Me offers more features than that. It also will allow for the easy sharing of printers and other hardware devices, and it lets multiple computers share a single Internet connection. Windows Me's Home Networking Wizard should make all of this easy to accomplish.

Another major leap in home networking will be Windows Me's support for UPnP (Universal Plug and Play). It works much like older Plug-and-Play technology, but Microsoft hopes UPnP will become the standard language spoken by all electronics in your home, including the refrigerator and television. This would effectively turn your entire house into a network that you can access and control from anywhere.

Should You Upgrade? Now that you know more about the improvements Windows Me is supposed to make over previous Microsoft consumer OSes, you likely wonder if it is worth the upgrade. The answer is, "it depends."

Microsoft's beta testers are working under a nondisclosure agreement, so we turned to the team at the Activewin.com Active Network (http://www.activewin.com) for its thoughts.

For home consumers with the right hardware, the upgrade decision seems clear-cut. "In our view, the upgrade is a good one for the consumer in terms of access to most of the mainstream hardware out there today," says Robert Stein, Activewin.com's site director. "There is also much better support for upcoming and recent hardware in Windows Me."

Gamers will appreciate the robust hardware and multimedia support Stein was referring to, and they will want to choose it over Windows 2000 if upgrading. Win 2000 has trouble playing several games on the market right now, but that should change as manufacturers release new drivers and patches. Win2000 should not turn out to be the abysmal gaming (and multimedia) platform WinNT is.

On the other hand, dual-processor support—a major selling point of Win2000—is absent from Windows Me. Some small businesses will be looking for a platform that lets them operate powerful network and Web servers, and Win2000 should fit that bill better than Windows Me. "It is hard to recommend the upgrade to Windows Me for businesses of any kind as it doesn't have the kind of features most companies will need," says Stein, echoing the sentiments of nearly everyone else we spoke to for this article. "A more logical upgrade for business users from Windows 9x is Windows 2000, rather than Windows Me," he says. But for small businesses with small hardware budgets, the system requirements for Windows Me may be easier to meet than those associated with Win2000. See the sidebar "Make Room for Me" for more information.

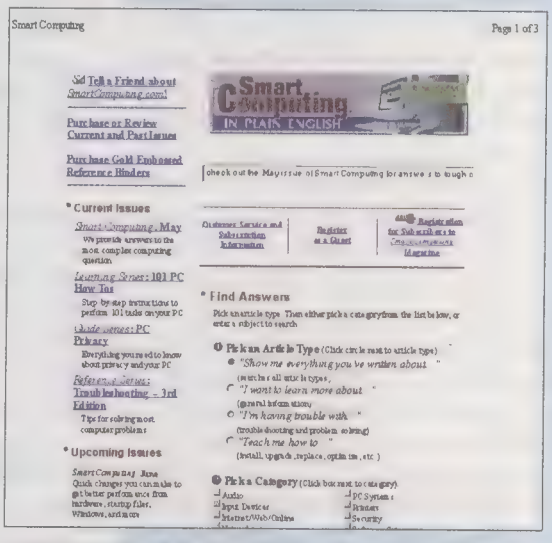
Once Windows Me is available, if you're considering buying a new system, be sure to choose one with Me installed. That way, you can be prepared for all the new hardware and software designed to take advantage of the new operating system. LS

by Tracy Baker

Internet Explorer 5.5

Most new versions of Windows come with a new Internet Explorer browser, and Windows Me is no exception. The new incarnation is IE 5.5, and we downloaded a beta copy to see what new tricks it could pull off.

At first glance, IE 5.5 looks just like IE 5.0. After weeks of testing, IE 5.5 still looks like IE 5.0. The changes Microsoft made in this version are miniscule, at least from an end-user's perspective. Most of IE 5.5's improvements are under the hood, creating a browser that supposedly processes Web pages faster and crashes less often. The beta certainly didn't let us browse more rapidly, but to its credit it didn't crash once during testing, even when a few dozen browser windows were open simultaneously and system resources were stretched thin.

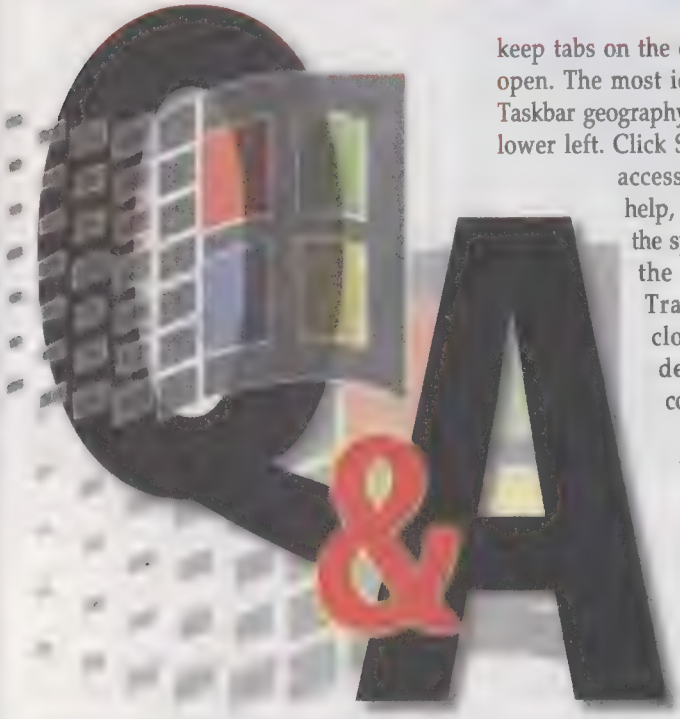


Internet Explorer 5.5, at least in beta form, offers a few enhancements that will wow end users. One example is the Print Preview feature, shown here.

That's not to say new features are entirely absent from this release. We liked the new Print Preview feature; although, it was a little buggy. Printing Web pages has always been frustrating because of inconsiderate site designs, but this new menu item lets you see how things will look before you commit to a printout. IE 5.5 should be worth the upgrade just for the enhanced reliability, and we hope Microsoft adds more nice touches such as Print Preview to the final release. □

Windows Wonders

Answers To Some Of The Program's Most Frequently Asked Questions



Whatever version of Windows you find on your computer—Windows 95, Windows 98, Windows NT, or Windows 2000—you'll be looking at a similar user interface. While many Windows components claim an intuitive design, it never hurts to know the answers to a few questions about navigating the operating system, finding help, and locating missing components.

How does the Taskbar work?

The Taskbar is the central hub of Windows, the spot where you access most of the built-in operating system (OS) functions and keep tabs on the other programs you have open. The most identifiable feature in the Taskbar geography is the Start button in the lower left. Click Start to launch programs, access the Control Panel, seek help, find files, and shut down the system. At the other end of the Taskbar is the System Tray, which can feature a clock and various controls depending on how your computer is set up.

In between these extremes is a place for buttons to appear as you launch programs. When you have more than one program open, click the buttons to switch between different windows.

In Win98, Win2000, and Win95 machines with Microsoft Internet Explorer installed, you also can use the Taskbar as a storage spot for shortcuts, an Address Bar for typing in file paths and Web addresses, and other nifty functions. Right-click a blank spot on the Taskbar and choose the Toolbars option.

Where do I find help?

Help figuring out Windows' most common quandaries is never far away. Click the Start button, then click Help. The Windows Help dialog box appears full of tips and answers.

While Help has evolved along with Windows, the basic concept remains the same in each version of the OS since Win95. Three tabs—Contents, Index, and Find or Search—let you browse for help by broad topic, scroll for specific subjects, or run a text search of all Help has to offer.

Help also includes a number of Trou-bleshooters that guide users through common problems. Start out in the Search or Find tab and type in a few words about your trouble. Look for Troubleshooters in the list of results that appears.

What's the difference between a file, a program, a folder, and a shortcut?

While it can be confusing for Windows newcomers, the various types of icons provide an easy way to organize and access information.

Files. These are the building blocks of computer data. A file can be information created by a user, such as a word processing document, a spreadsheet, a graphic, or just about anything else. Files also make up programs; most applications have one or more main executable files accompanied by various helper files or files full of settings and other configuration information. Program files can be in different spots, but for the most part they reside in the PROGRAM FILES folder and the WINDOWS folder. User files save where the user saves them; in most programs the default location is the MY DOCUMENTS folder.

Folders. These are devices used to group files together. When we click through the folders of Windows, we see file icons nestled together. Perhaps all of the files that make up a program are stored in a specific folder, or all of the word processing documents you have show up in the same folder. In reality, the bits of data that make up these files could be just about anywhere on the hard drive. The folder scheme is just a way to help humans organize everything. We can make new folders and folders within folders to store our files in a way that makes sense to us.

Shortcuts. These are small files that point to other files. You can recognize shortcuts by looking for a small arrow in the lower-left corner of an icon. Double-clicking a working shortcut performs the same function as double-clicking the actual file icon. However, deleting or moving the shortcut has no effect on the file; only the shortcut erases.

What's up with the System Tray?

The Taskbar's System Tray is a convenient spot used by various programs to let users know what's going on. A tiny icon in the System Tray might indicate the status of your machine or that a program is running. Some programs make use of the System Tray; others

Key Points

- All recent Windows versions have similar designs, which make it easy to upgrade.
- Help includes a number of Troubleshooting tips to guide you through problems.

don't. The most common System Tray item is the volume control, represented by a tiny speaker. A click on the speaker brings up a volume slider and a mute box for quick access to sound levels.

How do I customize the Start menu?

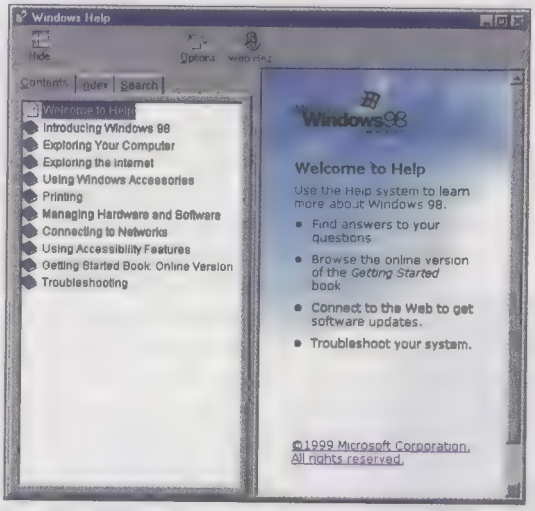
In any version of Windows, you can reorganize or delete Start menu program shortcuts by working with a folder-based version of the menu. Right-click the Taskbar and select Properties. Click the Start Menu Programs tab, then click the Advanced button. Windows Explorer appears with the complete Start menu on the left side and folder contents on the right. Move icons between folders, delete icons, or create new folders and subfolders to set things up the way you like.

Win98 and Win2000 also allow drag-and-drop editing within the Start menu itself. Simply grab a shortcut with the mouse and drag it to the proper place in the Start menu. If you're dragging a shortcut from the Desktop or some other folder, pull it to the Start button and wait for the menu to appear. Drop it wherever you'd like.

How do windows work?

Windows gets its name from the window-like boxes that define the operating systems' user interface. Most programs communicate with users through some type of window. For example, a word processor opens a window filled with buttons for accessing different functions and a large blank area in which to type. Other programs fill their windows with the controls necessary to make them useful.

Multiple programs can run at the same time in Windows, which means you might see more than one window on the screen. Use the small buttons in the upper right of each window to move, resize, minimize, or maximize a window. The button with the straight line minimizes a window to the Taskbar; the square or double squares button toggles a window between maximized (full-screen) mode and some intermediate size.



Windows Help doesn't always have the answers, but it's a good place to start looking.

The last button, marked with an X, closes the window or program.

To resize a window, first look at the middle button in the upper right. If it has two squares, click it once. The window should become at least a little smaller, and the button now displays a single square. Move the mouse over one of the window edges, hold down the left mouse button, and drag the window to the size you desire.

What do Plug and Play and USB mean?

A big hassle in the pre-Win95 days was getting all of the hardware that makes up a computer to cooperate with each other. The Plug-and-Play standard attempts to eliminate frustration and confusion by supporting devices that announce themselves to the operating system. Windows automatically installs the proper software drivers for Plug-and-Play devices. The user does nothing but plug the hardware in and play with it.

The first wave of Plug-and-Play devices represented a tremendous improvement, but today's USB (Universal Serial Bus) standard for external peripherals goes a step further. With USB, users can **hot swap** devices, or connect and disconnect devices at will while Windows runs. You can also connect USB peripherals to USB hubs that let you plug dozens of devices into the same computer. WinNT and older versions of Win95 date from pre-USB days and don't support the standard; Win98 and Win2000 machines should be happy to encounter a USB device, as long as your computer has a USB port.

How do I uninstall a program?

Deleting a shortcut in the Start menu does not rid your computer of the files that make up an application. To do that, open up the Control Panel (Start, Settings, Control Panel) and double-click Add/Remove Programs. In the Add/Remove Programs Properties dialog box, select the program you no longer want and click the Add/Remove button. The program's uninstall routine should begin, which will delete all of the files and settings associated with that program.

How do I share data among programs?

One of the main advantages of modern operating systems such as Windows is the ability to easily move information from one program to another. Some programs automatically work with one another by design, but you also can share data among windows using commands such as copy, cut, and paste.

For example, you might select text in a word processing program, then click the copy command (or press CTRL-C). Windows remembers the selection even when you open up another program such as a spreadsheet that can accept text. Place your cursor at the appropriate location in the desired program and choose the Paste command (or press CTRL-V) to see the words appear.

How can I back up files in Windows?

Windows includes a backup program that works well for simple jobs. Find it by clicking Start, Programs, Accessories, System Tools.

Options For Closing Windows

Shut Down closes all programs and either saves data in use to the disk or loses it.

Stand By typically saves all data from open programs in RAM (random-access memory) and then the computer shuts down everything but a trickle of energy.

Hibernate saves open data to the hard drive and then shuts off everything.

The Basics

If you haven't used Windows or a similar GUI (graphical user interface) before, all the buttons, icons, arrows, and other elements can be a bit bewildering. But the basic user operations in Windows are pretty simple once you get the hang of them.

Use the mouse for two common types of operations. First, you can move the mouse arrow over an icon or button and then right-click to perform some command. Click the mouse button twice (a double-click) to open a file or program represented by an icon. Click the mouse button once to press an on-screen button or select an item in the Start menu. Second, you can use the mouse to "drag" items such as icons or text from one spot to another; with the cursor over the item, press down on the left mouse button and move the mouse without letting up on the button. Releasing the button drops the item.

The keyboard comes into play in a variety of programs and Web pages that require typed text. Before playing with the keyboard, move the mouse cursor to the spot where you want to type. Click the mouse button once, and a blinking cursor should appear. Text will appear in that spot when you type.

After mastering these nuts and bolts, the rest of Windows will start to seem easy—at least most of the time. □

Windows Backup works with a variety of devices, including Zip drives, tape drives, and other popular media.

How do I delete files, and how do I get them back?

To get rid of files, open up the folder where the unwanted file resides and drag it to the Recycle Bin on the Desktop. The Recycle Bin stores files until you permanently delete them by right-clicking the Recycle Bin icon and choosing the Empty Recycle Bin command.

Check the contents of the Recycle Bin by double-clicking the icon and browsing the contents like any other folder. To move a file back out of the Recycle Bin, select it and choose Restore from the File menu. Keep in mind that once you've emptied the Recycle Bin, you can't restore the files.

What's the best way to find a file?

Windows makes it easy to find files on your hard drive or other drives connected to your computer. Click the Start button and choose Find, Files Or Folders. A small dialog box appears with space for you to type the name of the missing file or even just part of the name. Use the Look In: field to narrow your search to specific locations. The Containing Text: field is useful for word processing and other documents that include text within the file. Click the Find Now button and see what comes up.

Can I change the look of the Desktop?

You can gussy up the Windows Desktop—that blank expanse usually populated by icons and windows—just about any way you like. Besides making shortcuts to the folders, files, and programs you use the most, you can change the look of the underlying Desktop itself.

To start, right-click any blank Desktop area and choose Properties. The Background tab in the Display Properties screen lets users select patterns or wallpaper. Patterns are small bits of graphics repeated across the screen. Wallpaper is usually a larger picture saved in .BMP (bit map), .JPG (Joint Photographic Experts Group), or some similar format. By clicking the Browse button, you can look for pictures on your hard drive to display across the Desktop as wallpaper.

What's the difference between shutting down, hibernating, and other options?

Depending on the hardware available, Windows offers users several choices for closing up shop at the end of the day. Click the Start button, then Shut Down to see the list of options for your machine.

Shut Down is the most common method of turning off the OS and the rest of the computer. Shut Down closes all programs and either saves data in use to the disk or loses it. Turning on the computer again from a Shut Down means rebooting the whole system.

Stand By and Hibernate offer compromises between not turning off the computer at all and leaving it running 24 hours a day. Stand By mode (also known as Suspend or Snooze) typically saves all data from open programs in RAM (random-access memory) and then the computer shuts down everything but a trickle of energy needed to keep the RAM alive. Resuming from Stand By mode is usually pretty snappy. Hibernate saves open data to the hard drive and then shuts off everything. Resuming from Hibernate is not as fast as waking up from Stand By, but this mode uses less electricity and is a bit safer in that sudden power outages won't cause you to lose unsaved work.

Not all systems support modes such as Stand By and Hibernate, so don't be surprised if you can't find such options listed. Remember that you need to reboot Win9x systems frequently to keep the system stable, which means a complete Shut Down or Restart is necessary on a regular basis.

How can I get Windows to connect to the Internet?

Proprietary ISPs (Internet service providers) such as America Online provide their own connection software, but most ISPs rely on you to make the link to their modems. Windows gives you the tools with its Dial-Up Networking applet, which you can find in My Computer.

Dial-Up Networking is fairly simple to use. Double-click My Computer on the Desktop and double-click Dial-Up Networking. Then double-click Make A New Connection. Answer the questions using information provided by your ISP. When finished, you'll see a new icon in the Dial-Up Networking folder. You may need to configure a few more settings by right-clicking the new dial-up networking entry and choosing Properties. Click the Server Types tab and then the TCP/IP Settings button if your ISP requires this sort of treatment.

If you use a DSL (Digital Subscriber Line) or cable modem or a network connection rather than a telephone modem, connecting to the Internet means configuring Network Properties rather than Dial-Up Networking. Follow the instructions provided by your network administrator or ISP.

Do I have to use Internet Explorer?

Users fond of Web browsers such as Netscape Navigator don't have to settle for Microsoft Internet Explorer, even in newer versions of Windows where the line between Internet Explorer and the OS gets blurry. Alternative browsers still work fine in Windows right alongside Internet Explorer.

If you really, really don't like Explorer, it might not be easy to get rid of it altogether. Some of IE's functionality is built right into Win98 and Win2000, eliminating the possibility of any easy uninstall.

Do I need to run programs such as ScanDisk and Defragmenter?

Windows comes with a small assortment of tools designed to keep your files healthy and warn you about possibly catastrophic disk drive problems. While not as comprehensive as third-party solutions such as Symantec's Norton Utilities (http://www.symantec.com), the built-in programs cover the basics.

ScanDisk, which is accessible by clicking the Start button, selecting Programs, and choosing Accessories and then System Tools, checks for lost data floating around your diskette or hard drive and also runs a surface scan to find bad sectors that point to imminent drive failure. Running ScanDisk once a week or so keeps your file management system in top form.

Defragmenter (Start, Programs, Accessories, System Tools, Disk Defragmenter) rearranges the files on your drive so that bits of the same file are stored in the same place. Badly fragmented drives still work, but access might slow down over time. Defragmenting once a month or so might be necessary depending on how you use your machine.

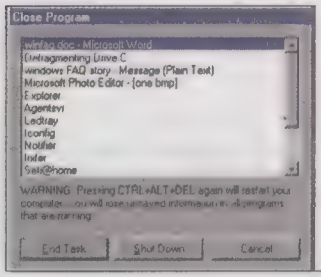
Do I need to upgrade to the next version of Windows?

Before making the switch, read up on what newer versions offer. You might find something of value to your situation. However, there's no reason to spend money just to keep up with the Gates's. If the Windows you have does what you need it to do, sit back and smile. For more information about the various Windows, see "Windows Shopping: Find Out Which Microsoft OS Is Right For You" in this issue.

How do I access diskettes, CDs, and other media in Windows?

The place to go is My Computer. Double-clicking this icon, usually found in the upper left of the Desktop, lets you see all of the drives attached to the machine. You should see one or more hard drives and a diskette drive at a minimum; most machines will also show a CD drive or other removable storage such as Zip drives. You can open any of these drives by making sure the correct media is available, then double-clicking the drive's icon.

To save files to writeable drives such as diskettes, drag files to the drive icon with the mouse or right-click a file, choose Copy, then right-click in the drive's window and choose Paste.



Pressing CTRL-ALT-DELETE usually helps you escape a frozen system. Look for the program causing the trouble and click End Task.

How do I deal with a frozen window or system crash?

Win95 and Win98 are prone to regular freeze-ups, when everything on the screen comes to a halt. Even more frightening is the "Blue Screen of Death," which appears at seemingly random intervals to provide an undecipherable error message along with an invitation to restart the computer. WinNT and Win2000 provide a substantially more stable environment and deal more gracefully with frozen programs.

Either way, the first thing to try when a window or the entire machine ceases to function is to press CTRL-ALT-DELETE. Windows may respond with a Close Program list of open programs and possibly some indication of which program is not responding. Select the program name and press the End Task button. You will lose any unsaved information in that program or window.

If pressing CTRL-ALT-DELETE does nothing, try pressing the combination again to restart the computer. If that doesn't work, press your system's reset button. There's not a whole lot more to try when the OS freezes up. Frequent freezes may point to incompatible software or hardware.

How do I turn on Windows' Accessibility features?

Since Win95, Microsoft has been incorporating a set of applets that provide users with hearing, seeing, or other impairments ways to use Windows more effectively. Experiment with the Accessibility options by double-clicking the Accessibility applet in the Control Panel (Start, Settings, Control Panel). If you can't find the icon, you might need to install the option from the Windows CD-ROM. Click Add/Remove Programs, choose the Windows Setup tab, put a check mark next to the Accessibility box, and click OK. LS

by Alan Phelps

How Can I Make Windows Fit Me?

To Customize . . .	Look In . . .
colors	*the Control Panel's Display applet for the Appearance tab*
individual programs	*the application's menus for Preferences or Options*
the Taskbar	*Taskbar Properties (right-click the Taskbar)*
window element sizes	*the Control Panel's Display applet for the Appearance tab*
the Desktop	*the Control Panel's Display applet for the Background and Web tabs*
icons	*the Change Icon dialog box (right-click an icon, choose Properties, then click Change Icon)*
mouse behavior	*the Control Panel's Mouse applet*
sounds	*the Control Panel's Sounds applet*

TI DSPs. Continuous [redacted] to the world of digital music.

TI DSP. A technology that brings music from the Internet into our homes with MP3, SDMI, ePAC™, AAC or any standard. Then takes it into the future with a new generation of products like digital radio, which provides CD sound from traditional radio stations. • More important, TI programmable DSP is a technology that is always connected to the future. As newer generations evolve, you're always just a software download away. So rather than retool and replace, you can simply reprogram. • TI programmable DSP is also a network of third-party companies working to invent new applications not yet dreamed of. It's a legacy of leadership that can give you a clear advantage. It's a broad portfolio of TI analog that delivers real-time connection to the real world. It's eXpressDSP™, our Open Software Environment that opens new ideas. • It's what all the noise is about. • Texas Instruments Digital Signal Processors. Powerful. Programmable. Engines of Intelligence. ▶ **www.ti.com/dsp**

PERFORMANCE
Application processing at a billionth of a second.

PROGRAMMABILITY
As newer generations of products evolve, you're always just a software download away.

OPEN SOFTWARE ENVIRONMENT
With code available today, you're able to get to market faster tomorrow.

eXpressDSP is a trademark of Texas Instruments. ePAC is a trademark of Agere Technologies. 16-90-1998

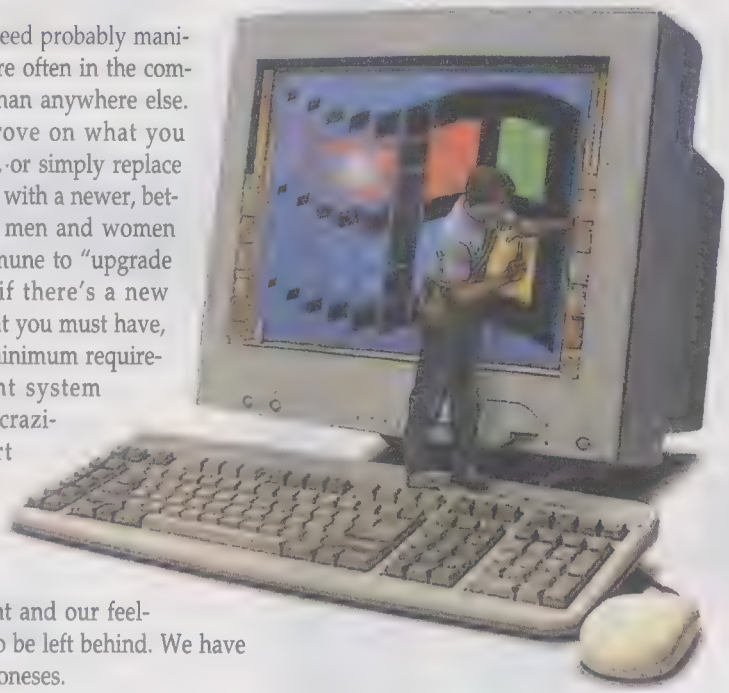
© 1999 T.

THE WORLD LEADER IN DSP AND ANALOG

TEXAS INSTRUMENTS

Upgrade Fever

Tips To Perform & Troubleshoot Windows Hardware Installations



The need for speed probably manifests itself more often in the computer world than anywhere else. The desire to improve on what you have, make it better, or simply replace an older, failing unit with a newer, better one affects both men and women alike. No one is immune to "upgrade fever," especially if there's a new piece of software that you must have, and it has specific minimum requirements your current system doesn't meet. This craziness is due in part to the hardware manufacturers constantly coming out with bigger and faster equipment and our feeling of not wanting to be left behind. We have to keep up with the Joneses.

■ **Know Your Resources.** Until the arrival of Windows 95 and Plug-and-Play hardware, upgrading your system was something best left to a computer technician. It used to be that all of your computer's resources had to be manually configured using either jumpers or switches. To set up the new hardware and avoid conflicts, you had to know what resources your existing hardware was using. Simply installing a new modem or add-on card in your PC could have you jumping through hoops trying to find free resources.

Peripheral hardware devices deal with two main computer resources: IRQ (interrupt request line) and I/O (input /output) address.

IRQ. This is a function of the computer hardware that signals the data bus and the CPU (central processing unit) that it needs attention. This could be something such as a modem signaling that it has data in its buffers ready to process. No two devices can share the same IRQ. An example of an IRQ is that of a standard parallel port. It normally uses IRQ 7. To make things interesting, computers from the 286 on up only have 16 separate IRQs (0 to 15) available.

I/O address. This is a three-digit **hexadecimal number** (a numbering system used in computers based on 16 digits—0 through 9 then A through F) used to identify and signal a peripheral device such as a sound card or modem. These address assignments must be unique, or conflicts can occur and one of the hardware devices will fail to work. An example of an I/O Address is 3F8, the address of serial port COM 1 (communications port 1). While there are quite a few free I/O addresses in the computer, each piece of hardware has a limited number of addresses it can use. This makes juggling I/O addresses a real challenge in a system with lots of peripherals.

The challenge is to find IRQs and I/O addresses out of a small number to choose from that don't conflict with another device. For most users, this can be a bit intimidating to do manually.

■ **Enter Plug And Play.** Plug and Play has taken much of the configuration worry away from the end user. Plug and Play is a combination of making the BIOS (Basic Input/Output System) and the operating system "smarter" and providing a way for them to communicate and work together to successfully allocate system resources. How they interact is a mystery and has led to the nickname "plug and pray."

Things are much better now, but in the beginning, Plug and Play caused more problems than it fixed. More often than not, a Plug-and-Play device would allocate resources already in use by other hardware, causing both devices to quit functioning. Many times other compatible resources were available for the Plug-and-Play device, but it grabbed its first choice and would not let you change it to any other settings. Clearing up the conflict meant you had to change the resources used by the other hardware to something that didn't interfere with the Plug-and-Play device. This defeated the purpose of Plug and Play.

Plug and Play starts with the BIOS. The BIOS detects each hardware device plugged into it when the system powers up. It identifies each device by an identification burned into the hardware that tells what type of device it is and what resources it would like to have. The BIOS does its best to allocate the free resources, especially IRQs, during the boot process. You do have some control over resource allocation in the BIOS, but only over the hardware physically built into the motherboard by the manufacturer.

The operating system, such as Windows 95, Windows 98, and Windows 2000 (Windows NT 4.0 does not support Plug and Play), handles the rest of the resource allocation. The operating system keeps a list of resources in use in the Registry. Other configuration files, called INF files, keep lists of the possible resource combinations for each device. As the system boots, Windows loads the last set of resource values from the

Key Points

- Plug and Play takes much of the configuration worry away from the end user.
- Replacing a modem is one of the most common computer upgrades; we'll show you how to do it.

Registry and tries to initialize the hardware using those values. If it detects a conflict or problem, you will get an error message alerting you to the failed hardware. Clearing it up is simply a matter of removing the device and letting Windows redetect it at the new hardware settings or by manually changing the resources it wants to use. Either way, you have a much better chance of coming out a winner than ever before.

Before You Begin

Installing your own hardware upgrade can be very rewarding if you take your time and follow our hardware tips.

1. Always make sure you have a backup of your system before attempting any type of upgrade. More often than not, you will not need to fall back on your backup. But in the worst case, if things go terribly wrong, a backup ensures that your important files safe and secure.
2. Another thing that can help you with your hardware upgrade is to already know what is in your system. You can get a lot of useful information from the System applet in Control Panel in Windows 95/98 (Win9x). The Device Manager tab will tell you what hardware is already in the computer, and by double-clicking Computer at the top of the list, you can see what hardware resources are in use, too. Windows NT 4.0 has a Windows NT Diagnostics program; find it by clicking Start, selecting Programs, and choosing Administrative Tools (Common). Windows NT Diagnostics provides the same type of information as the System applet in Win9x.
3. When installing new hardware that requires a software driver, make sure you supply it to the system when asked to do so. Sometimes we get lazy and let the default driver install instead of the newer one that came with the hardware. Resist that temptation and install the new driver if at all possible.
4. Follow good disassembly/reassembly techniques. Make sure you turn off your PC and unplug it from the outlet before you begin. Be careful not to drop anything such as screws into the system. Also, make sure you replace all ductwork that may be in your computer for cooling the CPU.
5. The biggest thing is to not panic if things don't go smoothly. Stop and try to understand what went wrong and what you can do to correct the problem. Many times a quick phone call to the local computer store is all you need to get you over a hump. □

■ **Move To New Hardware.** There are quite a few upgrades available to you to enhance your computer system. Some of them are easy and require little skill; others are fairly time-consuming and require advanced skills. Adding additional RAM (random-access memory), a new modem, or other add-on peripheral is relatively easy and doesn't require much by way of special skills. Swapping a CPU, motherboard, or hard drive can take a little more know-how and may be best left to a professional computer technician.

One of the most common computer upgrades is to install or replace a modem in your system. A few years ago, before the Web became such a prominent part of our lives, people enjoyed communicating with each other using bulletin board systems (BBSes). Most of the BBSes were text-based with little or no graphics on them, so a 14.4Kbps (kilobits per second) or 33.6Kbps modem was sufficient for playing games, reading mail, or chatting with friends. As the Web took over and BBSes fell out of favor, our middle-of-the-road 14.4Kbps modems just didn't quite cut it anymore. It was time to upgrade to a faster modem, one that would let you surf the Web more quickly.

The only real choices in fast modems are 33.6Kbps and 56Kbps versions. The 33.6Kbps modem has been around for quite some time and is reliable and stable. One other benefit is that all modem makers that put out a 33.6Kbps modem have software drivers for most every operating system available. But even though a 33.6Kbps modem is a lot faster than a 14.4Kbps modem, it is still not really fast enough to make the Web enjoyable.

The latest and greatest modem available is the 56Kbps modem. Developed a few years ago, the 56Kbps modem went through its share of tough times. In the beginning, there were two versions of 56Kbps modems to choose from: x2 and K56Flex. Over time, the two standards came together in a new specification called V.90, which led to mass acceptance of high-speed dial-up access to the Internet. Now just about every modem purchased is a 56Kbps V.90 modem, and all large ISPs (Internet service providers) support the fast connection.

There is another thing to consider when purchasing a new modem. You need to decide if you want to have one that installs inside the computer case (an internal version) or one that plugs into a serial port (an external version).

Internal modems have a couple of advantages over external modems. For one, they are usually less expensive because they do not require a case or power supply. Also, especially for older computers, an internal modem will come with a high-speed **UART (universal asynchronous receiver-transmitter**, a chip that handles the serial data through the modem). You need a high-speed UART to make sure the modem can send and receive data as fast as possible.

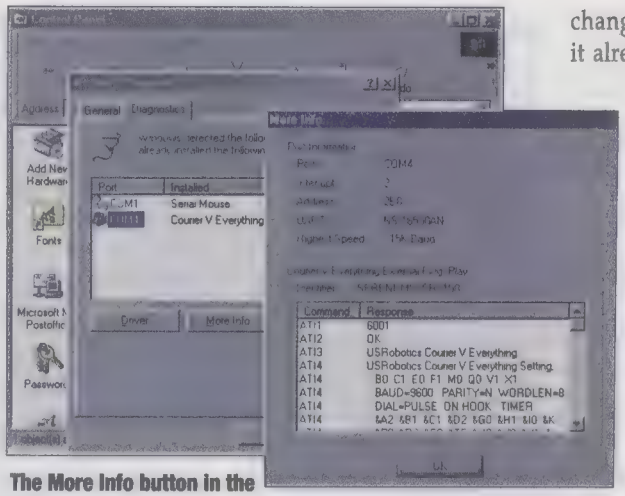
A big drawback to internal modems is that if a lightning strike should come in through the telephone line—assuming you didn't have any surge protection on the line—there's a much greater chance the lightning could zap the computer. The internal modem lets the surge come into the computer, while the external modem keeps it outside.

Another disadvantage is that you need a free slot and free resources in your computer to install the modem. An external modem uses one of the COM ports included with the computer and doesn't tie up any additional hardware resources.

Once you've made the decision to install a modem, there is one more question you have to answer. You have to decide which bus type of internal modem to purchase. There are two bus types to choose from: **ISA (Industry Standard Architecture**, based on a 16-bit data path) and **PCI (Peripheral Component Interconnect**, based on a 32-bit data path). Most computers made now only come with one or two free PCI slots. Older computers,

and some custom-built PCs, will still include ISA slots.

Like we saw with the question of internal vs. external, there are arguments for both ISA and PCI modems. Both buses support Plug and Play, but many ISA modems still require you to manually set their system resources using jumpers. Also, PCI modems may come with drivers that only work with Windows-based applications. If you have a DOS-based communications program, you may not be able to get it to work with a PCI modem.



The More Info button in the Modems applet in Control Panel is a quick and easy way to check if your modem is functioning properly.

Install An Internal Modem.

We are going to take you step by step through installing a typical 56Kbps internal modem. We will see some of the Plug-and-Play aspect of the BIOS and Win98 come into play as we add this new hardware to our system. We decided to install a 3Com/U.S. Robotics Dual Standard V.90 modem in our Dell Dimension desktop to illustrate the typical steps needed to get a modem installed and to show you what to do to make sure your modem is up and running correctly.

We'll assume you are comfortable working inside your computer, you have the power and the cover off, and you have access to the system bus. Before you start, be sure to ground yourself by touching the metal part inside your computer's case. Now you'll want to remove your existing modem if you have one. If it is an external modem, disconnect the serial cable from the back of the computer and set it to the side. If it's an internal one, pull it free from the computer.

Locate a free PCI slot in your computer where you can plug in the new modem. A PCI slot is a short slot set back a little bit from the edge of your motherboard. You may have to remove a piece of metal that covers the slot to properly install your modem.

Press the modem firmly into the PCI slot and secure it to the back of the case using a small screw. If you had to remove any other cards or brackets to get to the PCI slot, replace them now. Go ahead and plug your telephone line into the jack on the modem marked "wall" or "telco." Leave the computer cover off for right now.

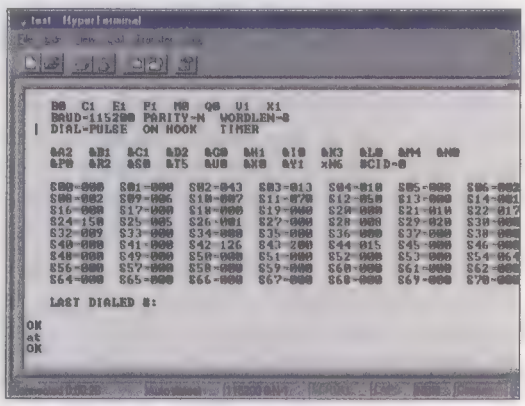
At this time, you are ready to power on the computer and let the magic of Plug and Play take over. If your computer displays a quick "splash screen" summarizing the hardware detected by the BIOS after the POST (power on self test) completes, you will see your newly installed modem listed as a device, along with any other installed hardware in your system.

Setting the modem up varies a little depending on which version of Windows you run. Because Windows 95/98 (Win9x) and Windows 2000 are Plug-and-Play compatible, they will automatically allocate resources to the new hardware as the system boots up. During the first boot after installing your modem, Windows will detect the change in the hardware and look to see if it already has a driver for the modem in its Driver Information Database. If it doesn't or it is out of date, Windows will prompt you for a new or updated version.

Depending on the manufacturer, the drivers for the modem will come either on a diskette or on a CD-ROM. Windows will prompt you for the driver diskette and then copy it off of the media and into the Driver Information Database. It then loads the driver into the Registry using the set of free resources it detected.

You can run into a couple of problems with this process if you don't pay close attention. If for some reason Windows doesn't update the driver off the diskette, you may have to manually choose the correct modem from a list of available drivers. Every once in a while, we have come across situations where we have had to choose an alternate modem driver from our modem list. This in no way changes the Plug-and-Play aspect of the system. Plug and Play is still behind the scenes juggling resources and keeping track of used and available resources.

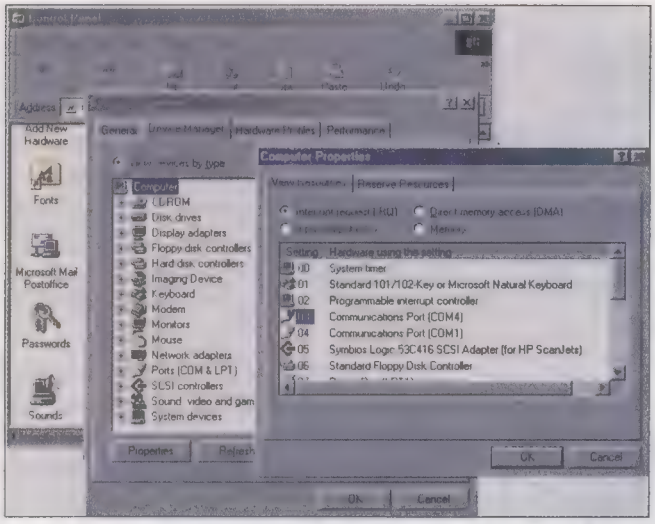
If you didn't get a new driver with your modem, simply choose a modem from the list of available drivers from the same manufacturer, in the same family, if possible. Sometimes you will not have the driver CD-ROM for a modem handy, so you can use a similar modem definition to make the system work. We have had success using a U.S. Robotics 33.6Kbps modem definition with a V.90 modem, for example. We don't recommend this as a standard practice, but it will work in a pinch.



Windows NT 4.0 users can use HyperTerminal to check their modem's status.

Interrupt Request Lines (IRQs)

0	Timer
1	Keyboard
2	Link to IRQs 8-15
3	COM2, COM4
4	COM1, COM4
5	LPT2
6	Floppy Disk Controller
7	LPT1, LPT3
8	Real Time Clock
9	Redirected IRQ2
10	Reserved
11	Reserved
12	PS/2 Mouse Port
13	Math Coprocessor
14	Hard Drive Controller
15	Reserved



You can find out what hardware uses what resources by double-clicking the Computer icon in the Device Manager tab of the System applet.

Windows NT 4.0 users don't get the step-saving advantage of auto-detecting the modem during the boot process. To get a modem to work in the system, you have to manually start the installation process of the modem through the Control Panel, Modems applet. Windows NT 4.0 will run a detection script to save you from selecting the modem out of a list, but unlike Win9x and Win2000, it won't do it at boot time. Like Win9x and Win2000, if you have a driver diskette with newer drivers than the ones that come with the system, you will want to add them by clicking the Have Disk button.

■ **Check Your Installation.** Now that you have your modem installed in your computer and Windows has a driver loaded, it is time to see if everything is working like it is supposed to. There are a couple of ways to verify that your modem is working properly before actually trying to make a call. One way with Win9x and Win2000 is to go to Control Panel, Modems and choose the Diagnostics tab. When you click this tab, you will see your modem listed next to the COM port it is connected to. For example, in our test system, our modem is installed on COM 4.

Click the COM port next to your modem and choose More Info in the middle of the screen. If everything works correctly, a pop-up window will display the COM port number, the IRQ and I/O port assigned to the COM port, and the type of UART. In the dialog box at the bottom of the window there's a lot of information such as the modem's firmware version and other diagnostic result strings. You don't need to be concerned with this information. It is just a good indicator that the modem is functioning properly. If you see this information, you are ready to go.

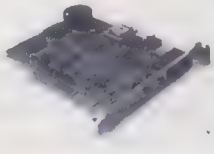
The other way to check your installation, and this works for all versions of Windows including WinNT, is to use HyperTerminal found in Start, Programs, Accessories, Communications, HyperTerminal. HyperTerminal is a full-function communications package that comes with Windows. It will let you do a couple of quick tests to see if your modem is responding correctly. To do this, we will go through the process of creating a test profile in HyperTerminal.

When you open HyperTerminal, it will prompt you for a name for the profile. Give it a name such as Test and click OK. The next thing HyperTerminal asks for is the device to connect to. You should see your newly installed modem in this list. Choose it, leave the Phone Number field blank, and click Cancel. This will put you in the main HyperTerminal window. Type the letters **AT** and press ENTER. If everything is working correctly, you should get an OK response back. If not, double-check that you have the correct modem chosen and that it is on the right COM port.

If all has gone well, and you get an OK response from your modem, you are all set to replace the computer cover and set up your communications program to take advantage of your new speedy modem.

Upgrading or adding new hardware in your computer isn't very difficult now that Plug and Play is more of a reality. Take your time and follow the installation directions for the hardware, and you will be fine. LS

by Keith Schultz



Modems such as this 3Com56K Internal Voice Faxmodem are easy to install and don't require a lot of special tools or skills.

Modem Buying

If you're considering purchasing a new modem, here are some things you'll need to consider:

- The 33.6Kbps (kilobits per second) modem has been around for quite some time and is reliable and stable, but it still may not be fast enough for many users.
- If you plan to buy a 56Kbps modem, make sure it supports the V.90 standard.
- You'll have to choose between an internal or external version. Internal modems are usually less expensive and come with a high-speed UART (universal asynchronous receiver-transmitter). External modems don't require a free slot inside your PC and provide better protection against lightning strikes.
- You'll also have to choose between two bus types: ISA (Industry Standard Architecture) and PCI (Peripheral Component Interconnect). Most computers made now only come with one or two free PCI slots. Older computers, and some custom-built PCs, will still include ISA slots. □

Make PCs Connect

Tips To Set Up & Troubleshoot Windows Networks

As computer networks gain popularity, Microsoft continues to make networking easier than ever with its Windows 98 Second Edition (SE) and Windows 2000 operating systems. These two operating systems include powerful networking features that make networking possible for almost everyone.

Whenever you use computers in close proximity to each other, you should consider setting up a network to share important resources. Networks let users share files, printers, Internet connections, and more. We'll show you the basic steps involved in setting up a simple network using both Win98 SE and Win2000 Professional, but Windows 95 and Windows NT should have similar instructions. Both the Win98 and Win2000 operating systems (OSes) help you get up and running quickly in a Windows networking environment. We'll also give you some pointers to improve your network performance by using utilities such as Disk Defragmenter, and we'll show you how to troubleshoot your network connection problems if and when they arise.

Key Points

- It's relatively easy to set up a network using Win98 SE or Win2000 Professional.
- You can control access to your network resources, attach to network drives and printers, share an Internet connection among network computers, and diagnose and fix network connection problems.

■ Hardware Requirements.

Before you configure the networking components in Windows, you need to make sure you have the right networking hardware in place. To create a network among PCs, you need NICs (network interface cards), a network hub, and networking cable to connect your computers together. NICs are hardware devices installed in an expansion slot inside your computer that let your computer communicate with the network.

Most computer networks today utilize a star network topology. In this type of networking setup, all of the computer network cables meet at a central location and go to each computer from this center of connectivity. A piece of hardware known as the hub rests at the center of the star topology. The hub completes the physical layout of the network by tying all of the network cables together.

When you select NICs and a hub, make sure you match the speed of the hub and the networking cards. For example if you purchase 100Mb (megabit) Ethernet adapters, be sure to also purchase a 100Mb Ethernet hub. If you plan to use older network cards that are only capable of running at 10Mb together with newer 100Mb Ethernet adapters, you might consider purchasing an autosensing hub that lets you mix and match 10Mb and 100Mb Ethernet adapters.

You'll also need cabling. Most computer networks use a type of cable known as Cat 5 (unshielded twisted pair Category 5). Cat 5 is a special cable designed for high-speed data communications and has a maximum throughput capacity of 1Gb (gigabit).

■ Windows 2000 Or Windows 98.

The decision as to which Windows OS to choose for your network server and client computers is sometimes difficult. When choosing a Windows OS, one of the most important factors to consider is network security. Win98 and Win2000 handle security in different ways. To understand the security differences between the Windows OSes, you need to understand the differences between peer-to-peer networking and networks based on the client/server model.

Win98 makes it easy to set up and manage a network among small workgroups of computers. Every computer in a Win98 network is capable of both sharing and using information equally. In this type of network configuration, computers on the network are peers, which is where the term peer-to-peer networking originates.

In a Windows peer-to-peer network, each computer with a shared resource manages its own security. To keep network management simple, Microsoft implemented share-level security in all of its Windows 9x OSes. In share-level security, users on the network either share or don't share a resource. Windows networking does not

TCP/IP is the protocol used on the Internet, and it can be difficult to set up if you have never used it before. If you are unfamiliar with the way the TCP/IP works, you should use NetBEUI as your default network protocol.

allow for specific user authentication for a particular network resource.

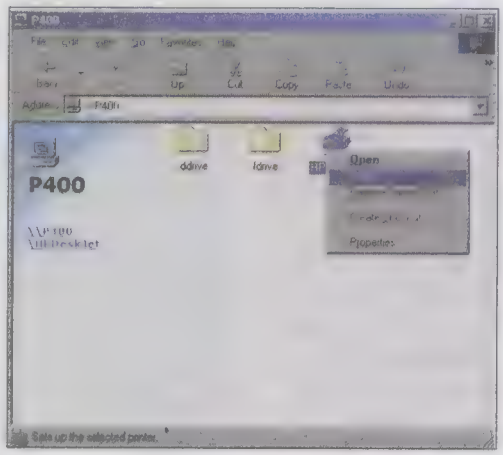
Win98 lets you publish resources to the network and either make them read-only (users can read information from but not save information to the resource) or allow users full access to the shared resource (users can read and write information). To allow some users read-only access and other users full access, Win98 has you specify a password that lets users have full access to a read-only resource. While this type of networking is fine for small offices, it does not give network administrators control over network resources from a central location, and it does not really grant access to specific users. Once a network shares a resource, anyone in that particular workgroup is able to access the information.

Win2000 provides tighter security than Win98, which makes it ideal for networks that require user authentication. You can configure Win2000 to work in a peer-to-peer network configuration in much the same way as Win98. When used in a peer-to-peer network configuration, Win2000 utilizes user-level access control instead of the share-level access control found in Win98.

But keep in mind Microsoft designed Win2000 primarily for larger network configurations, and it works around the client/server networking model. **Client/server networks** have a central point on the network (typically the server computer), which authenticates users and grants users network rights appropriately. Businesses commonly use these types of networks because of the central management and tighter security. Users gain access to specific network resources based on their login name (unlike peer-to-peer networks where users have access to the entire work-group). Administrators of these types of networks have a central point of administration and can classify users into different groups, such as accounting and secretarial, making it easier to manage and assign rights to new users.

■ **Planning The Network.** After you choose the Windows OS that works best for you, you need to devise a plan for your network configuration. Planning a computer network is one of the most often-overlooked factors. Instead of jumping straight into installing your network equipment and sharing everything possible, you need to consider what users really need to access, what computer you will use for your server, and what type of network security you will implement.

We strongly recommend sharing resources on a single computer for a small network configuration. If every computer on the network shares information, it eventually becomes confusing when you are looking for data files. Keeping all of your network data in a central location is easier to manage, and it also provides a central point for backup of your important data. If you keep your important data spread out among several network computers, security becomes difficult to manage, and you need to back up every computer with shared data. Before you start setting up your network, you should have a good idea of what you are trying to achieve.



Win98 makes it easy to attach to a network printer.

■ **Up & Running.** Win98 and Win2000 have similar networking components. When you install your network card into your computer using either Win2000 or Win98, Windows automatically installs the basic networking components needed for running your computer as a Windows networking client. These networking components include network protocols and network client software.

Network protocols are software components that let computers communicate with each other. The two protocols Windows installs are TCP/IP (Transmission Control Protocol/Internet Protocol) and NetBEUI (NetBIOS extended user interface). Windows automatically installs these two protocols by default, but you only need one network protocol for computers to communicate on a network. TCP/IP is the protocol used on the Internet, and it can be difficult to set up if you have never used it before. If you are unfamiliar with the way the TCP/IP works, you should use NetBEUI as your default network protocol. NetBEUI lets you use Network Neighborhood to find other computers on the network without any of the special tweaking that's required when using TCP/IP.

Win2000 and Win98 both automatically install the Client For Microsoft Networks when you install your NIC. This client software runs on top of the network protocol (TCP/IP and/or NetBEUI), and it lets client computers log on to all Windows-based servers, including Win2000 and Win98 Workgroups.

■ **Name Your PC.** After you install the Windows client software and necessary protocols on your networked systems, you need to make sure they are all on the same workgroup. A **workgroup** is a group of computers on a network that are all part of the same logical unit. Every computer on the network needs to have a unique computer name, but the workgroup for all of your network client computers must be the same.

When you assign workgroup and computer names, you need to follow some basic rules of the NetBIOS (Network Basic Input/Output System) naming scheme. The first thing to remember is that names you assign to workgroups and computers need to be 15 or fewer characters. You also should try to use names that help you identify where a computer is on the network. NetBIOS names should also begin with a letter; you can use numbers and other characters in any other part of the name. When assigning names, you should also try to avoid using special characters such as the pound sign (#) and the at sign (@). These characters can sometimes cause problems when attaching to resources shared on the network.

Setting the computer name and workgroup in Win98 is easy. Right-click the Network Neighborhood icon on the Desktop and select Properties. Next, click the Identification tab. Here you can set your computer and workgroup name.

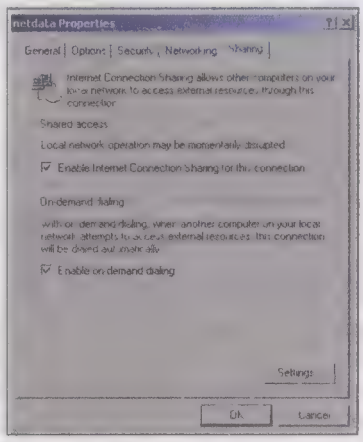
Setting the computer and workgroup name in Win2000 is similar to Win98. Right-click My Network Places on the Windows Desktop and select Properties. Make sure you don't have a network connection highlighted by clicking anywhere on the right area in the Network Connections window. On the left, select Network Identification and then Properties. Here you can set the computer name and workgroup for your Win2000 client computer.

■ Server Services. If you plan to use your Windows computer as a network server, you need to add the server software to both Win2000 and Win98. The Microsoft server service lets you publish the resources on your computer to the rest of the network. It is required only if you plan to share information on your computer to other computers on the network.

To install the file and print sharing service on Win98, click Start, choose Settings, select Control Panel, then double-click the Network icon. Next, click Add and double-click Service. From the Services window, select File And Printer Sharing For Microsoft Networks, then click OK.

If you use Win2000 and need to share resources on your computer, install file and printer sharing form Network And Dial-Up Connections in the Windows Control Panel (Start, Settings, Control Panel). Right-click your LAN (local-area network) connection and select Properties. From the Network Connection window, select Add, Services.

■ Sharing A Drive Or Resource. Securing a shared hard drive or file folder on your network is not really a problem with Win2000 because you can restrict access rights to areas you do not want users to access. However if you run Win98 as your network server, you should plan your shared resource strategy to help maximize your network security. If you share your C: drive to the network with Win98, you open up potential security problems.



Win2000 lets you enable Internet Connection Sharing to let all or some network users access the Internet.

For example: If you have your C: drive shared as a network resource with read and write access, anyone on your network can modify system files in your WINDOWS directory, which could potentially render your server computer unbootable. To increase network security so client computers don't have a chance to modify important files, it is best to create a new folder on your server computer that you'll share as the network resource and not share the entire drive to the network.

You can create the new folder anywhere on your computer by using either the Windows Explorer or My Computer. Right-click where you want the new folder and select New, Folder. After you create a new folder on your computer that network clients will use, you should move any information they need to access into this folder.

Share a folder using Microsoft Win98 by right-clicking the folder and selecting Sharing. The folder Properties window opens to the Sharing tab, where you can give your resource a shared name for the network. Just click Shared As and enter the resource name in the Share Name box. If you want to enter a detailed description about the shared resource, you can enter it in the Comment dialog box.

Access rights are set below the share name and comment box. You have three different types of access: Read-Only (users cannot write data), Full (users can read and write data), and Depends On Password. If you choose Depends On Password as your access type, you can assign Read-Only and Full access passwords in the dialog boxes provided. When you assign a password to both Read-Only and Full access, users need a password to access the resource in any way. This prevents users on the network without a password from using your shared network resource.

Sharing a resource with Win2000 is a little more involved than sharing a resource with Win98. Before you share a resource on a Win2000 computer, you need to create user login names so Win2000 can authenticate network users and grant them access to your shared resource.

Create new users in Win2000 in the Users And Passwords applet in the Control Panel (Start, Settings, Control Panel). With the applet open, click the Add button to launch the New User Wizard. The wizard prompts for user information such as username, description, password, and a user access level. After you create network users, you can share your network resource and assign user rights.

To share a resource using Win2000, browse to the drive or folder you want to publish to the network with either Windows Explorer or My Computer. Right-click the resource and select the Sharing option. As with Win98, select Share This Folder and enter a share name for the resource in the dialog box. Give the resource a user limit to specify how many simultaneous users can access your network resource. You can set up user limits to make sure you never use more copies of a program than you have licenses for.

By default, all of your users have access to a newly shared network resource. You can restrict access to your shared resource by clicking the Permissions button at the bottom of the Sharing window. First remove group Everyone by highlighting it and clicking the Remove button. You can now add individual users by clicking the Add button and selecting them from the user list. Adding users this way also lets you choose individual user rights

(Read, Change, Full Control) to the resource. This method of assigning rights, known as user-level access control, gives you much more control than the share-level access control in Win98.

■ **Sharing A Printer.** While sharing hard drives and file folders is an important part of Windows networking, you also can share printers. Windows handles printer sharing in much the same way as sharing a folder.

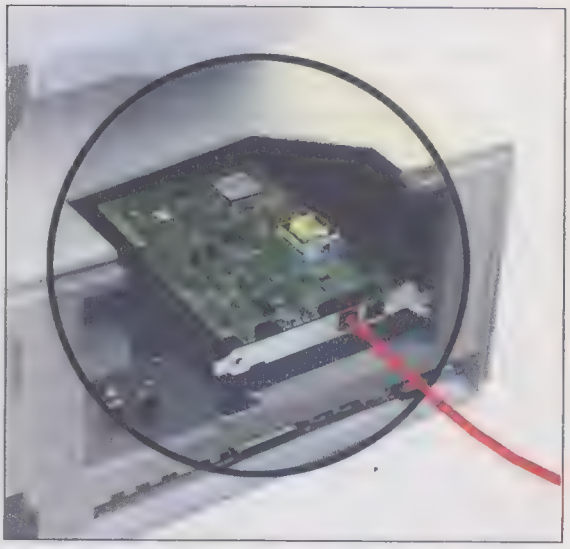
To share a printer on both a Win98 and Win2000 computer, right-click the icon for the printer you wish to share on the network and select Sharing. The printer's Properties dialog box opens. Click the Sharing tab. On this tab, select Shared As and give the printer a network name. Enter the printer information and click Apply. Anyone on the network can now access the printer.

If you run Win2000, there is an additional button labeled Additional Drivers. This section lets you install other versions of the printer drivers so Windows can automatically deliver and install them on client computers running a variety of different platforms and Windows OSes. This feature can save network administrators time when installing printer drivers on client computers because the drivers are automatically delivered to the client computer, eliminating the need to carry printer drivers to every computer that needs to use the network printer.

Win2000 makes another security feature available to users. You can restrict access to a network printer by selecting the Security tab of the printer's Properties window. From this screen, you can limit access to specific users on the network by using the same technique we talked about in the previous section on sharing a folder on your hard drive. You can grant users rights to Print, Manage Printers, and Manage Documents.

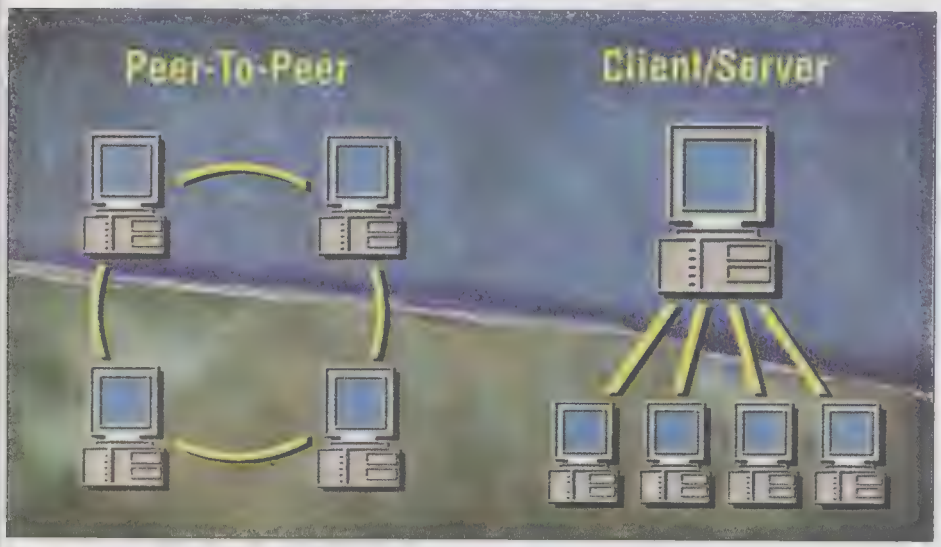
■ **Make The Network Connection.** Once you have your network resources shared on your server computer, you can connect to them and use them as if they were local drive letters. You attach to server resources just about the same in Win2000 and Win98. The only real difference is that Win2000 uses My Network Places instead of Win98's Network Neighborhood.

To connect to a shared network folder, you need to browse the network using either My Network Places or the Network Neighborhood, depending on which OS you use. Double-click the server computer's name, then right-click the resource you want to use and select Map Network Drive. A drop-down box lets you select the logical drive letter you want to associate with the network resource. If you plan to use this resource often, be sure to include a check mark in the Reconnect At Logon box so your computer automatically maps this network resource for you. After you are done, you can use the network resource as if it were a local drive letter on your computer.



If you plan to set up a network, each computer will need a network interface card, such as the one illustrated here.

Win2000 and Win98 also handle attaching to a network printer in similar ways. To connect to a network printer from a client computer, browse the network the same way you connect to a network shared folder. When you see the printer you want to use, select Install. If you use a Win2000 server with the additional printer drivers installed for your computer, Windows automatically installs the printer drivers on your computer. If not, you will then see the normal wizard for adding a printer. Select the printer type and follow the wizard. You can now use the new network printer from your client computer.



In a peer-to-peer network, all the computers have equal weight. In a client/server network, the server is the most powerful computer. Other computers, called clients, connect to the server so they can share its capabilities.

■ **Microsoft Internet Connection Sharing.** Now that you have shared printers and network drives, you might want to share an Internet connection among your users. Microsoft makes this simple and straightforward using Internet Connection Sharing. Microsoft includes the Internet Connection Sharing component in both Win2000 and Win98 SE.

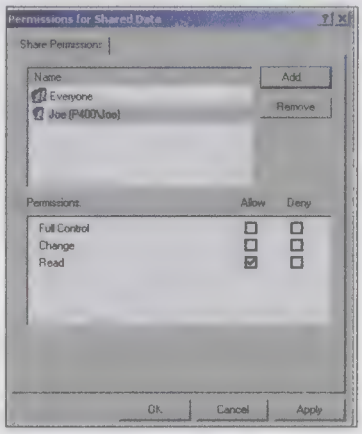
To install it under Win98, open the Add/Remove Programs applet in the Windows Control Panel (Start, Settings, Control Panel) and select the Windows Setup tab. From here, scroll down and select Internet Tools and then click the Details button. Put a check in the box next to Internet Connection Sharing and click OK. Windows then installs the needed components.

The Internet Connection Sharing Wizard starts to help you configure your setup. It asks if you use a dial-up connection or a high-speed connection so it knows which interfaces to examine for sharing your Internet connection. It then asks you to select the adapter that maintains your connection to the Internet. After you select the adapter, the Internet Connection Sharing Wizard creates a client diskette for computers that need to access the shared Internet connection. After Windows creates the client diskette, you need to reboot the computer before it can share its Internet connection.

If you use Win2000 you don't need to install any extra components to use Internet Connection Sharing. All you need to do is open the Network And Dial-Up Connections applet in the Windows Control Panel, then right-click the Internet connection you want to share to the network and select Properties. When the connection's Properties window comes up, click the Sharing tab. Put a check in the box next to Enable Internet Connection Sharing For This Connection.

The easiest way to get a client computer on the Internet using Win2000 or Win98's Microsoft Internet Connection Sharing is by setting it up to automatically receive an IP (Internet Protocol) address. Do this in the Network applet in the Control Panel under Win98 or in Network And Dial-Up Connections in Win2000. Select the TCP/IP protocol bound to your network adapter and click Properties. Make sure to select the option Obtain An IP Address Automatically and click OK. When you reboot your computer, the Internet Connection Sharing server on your network automatically assigns IP information to your client computer. After you reboot, run the Browser Connection Setup Wizard you created when you installed Internet Connection Sharing on the server. When it finishes, you can browse the Internet from client computers on your network.

Fax Servers. Many homes and small businesses also can benefit from installing a fax server on their network. While both Win98 and Win2000 provide desktop fax support, neither provides native network fax support at this time. To get a fax server up and running so network client computers can send and receive faxes across the network, you need to purchase a third-party fax application. If you need to send and receive faxes over your network, you should check into Symantec's WinFax PRO (http://www.winfaxpro.com) or ZetaFax from Equisys (http://www.zetafax.com). Both of these applications support Win98 and Win2000. All you need to use either of these products is a fax-capable modem.



In Win2000, you can set resource permissions to control which users have access to information.

Quick Troubleshooting. Even the best of networks occasionally experience problems. Now we'll run through a few of the more common trouble spots and offer advice on fixing the problems.

Trouble saving to a network resource. It is common for users to have trouble saving information to a newly assigned network resource. When you first share a resource on a Win98 network, Windows automatically sets the access type for Read-Only. Read-Only access lets network users access the computer and read data from it, but it doesn't let them change or save information back to the computer.

To let users write data to a shared network resource you must change the access type to Full Access. Do this by right-clicking the shared resource and selecting Sharing from the pull-down menu. Next, click Full under Access Type. Users should now be able to change and save information to your shared network resource. If you want to let only certain users write information to your shared resource, you can select access type Depending On Password. Set the password at the bottom of this screen; it applies to all users needing to write information to your shared resource.

If your network users have trouble saving information on a Win-2000 network server, you should check to see that the users have write access to the shared resource. You can check the network rights by right-clicking the resource and selecting the Sharing option. With the Sharing window open, click the Permissions button. Here you need to make sure the user has rights to access the resource. Also assign the Full Control permission.

Connection problems. If you have trouble making network connections to another computer, the first thing to check is the physical layer of your network—the hardware. If you use Cat 5 cable, the first and easiest thing to check is the lights on the network hub and the Ethernet adapter. If the physical cable connection is good between the computer and the hub, both devices should have a link light indicating there is a good cable connection between them. If there is no link light, chances are the cable has a problem. Swap the cable with a new one and see if the link lights come on. If the link lights still fail to come on, try moving the cable to a different port on the hub. This should give you a link light. If these steps fail, try replacing the network card in the computer. After you get a link light between the hub and the network adapter, you can feel confident that the physical connection between the computer and the hub is good.

Can't see other network computers. If you verify your network cable and hardware are OK, and you still can't see other computers on the network, double-check your client, protocol, and workgroup settings. If you have not installed or properly configured any of these, you will not be able to participate in the network and use shared resources on other computers.

In Win98, check all of these settings from the Network applet in the Control Panel

Tips For Sharing Resources

- ✔ Don't share an entire drive; create a separate folder to contain shared files.
- ✔ Give your shared resource a name and description.
- ✔ Set access rights based on users' needs.
- ✔ In Win2000, you can set up user limits to avoid breaking license agreements.

Defrag searches your hard drive and puts all of the files back together improving overall system performance.

(Start, Settings, Control Panel). Make sure you have installed the network protocol you use for your network (commonly NetBEUI or TCP/IP) and that the primary network logon is set as Client For Microsoft Networks. Also, click the Identification tab and make sure your computer name is unique on the network and that you have the correct workgroup set.

If you use Win2000, you should check the same settings in your network setup. Select the Network And Dial-Up Connections applet from the Control Panel. Right-click your Local Area Connection and select Properties. Make sure you have installed the protocol in use on your network and the Client For Microsoft Networks. Also make sure there is a check in front of the protocol and client so Windows knows it is supposed to use them. When you are finished, check to make sure you have a unique computer name and the correct workgroup set by clicking Network Identification.

Use Defrag. Win98 and Win2000 both include a defrag utility. This hard drive utility defragments files on your hard drive, making sequential reads faster and increasing overall system performance. With frequent changes to data files, hard drives become fragmented. **Fragmentation** occurs because of the way in which Windows writes changed data files back to the hard drive. It first writes the data back to the original location on the hard drive where it retrieved the data. Then it puts the remaining data on the next free available sector on the hard drive. After you've modified a file a number of times, the file spreads out all over the hard drive. Performance suffers because the file is not in all sequential sectors. The heads of the hard drive must move around the hard drive and put the file back together. Defrag searches your hard drive and puts all of the files back together improving overall system performance.

Start the defrag utility the same way in Win98 and Win2000. Right-click a hard drive you want to defragment and select Properties. When the Properties window comes up, select the Tools tab and Defragment Now. The defrag program launches and prompts you for the drive to defragment. As the defrag program works, it shows you a graphical display of its progress. LS

by Scott Jones

Quick Networking Tips

1. Make sure your server computer is one of the fastest computers on your network. Because your server machine needs to serve other computers information on the network, it needs to have plenty of RAM (random-access memory) and a fast processor speed to keep network performance at optimum levels.

2. In a peer-to-peer network configuration, try to keep your important data in a central location. This helps you keep track of your data, making it so you don't have to search every network computer trying to find your important data files. It also keeps you from having the same data on several network computers. If you have data spread out on a network, you might have trouble locating the most current copy of a data file.

3. In a new network configuration, be sure to choose 100Mb (megabit) Ethernet equipment. Faster 100Mb Ethernet adapters and hubs cost a little more than their 10Mb counterparts, but they offer up to 10 times the network throughput.

4. Minimize the number of shared resources on your network. Too many shared resources make the network difficult to use. Minimizing shared resources also makes network management and backup easier.

5. Give your computers descriptive names. This helps you quickly find the resources you need.

6. If you plan to share an Internet connection among your network users, be sure to check into the new high-speed Internet connection mediums such as ISDN (Integrated Services Digital Network), DSL (Digital Subscriber Line), or cable modem. Sharing an analog modem Internet connection is still OK for a couple of simultaneous users, but the new high-speed Internet technologies are coming down in price and offer up to 200 times the speed of a dial-up modem.

7. Running the defrag utility on server computers helps to ensure that a hard drive retrieves data as fast as possible. Running this utility at regular intervals also ensures network performance is at its best.

8. If you only connect two computers in a network configuration, you might consider using a crossover cable instead of a hub. A crossover cable is a piece of Cat 5 (unshielded twisted pair Category 5) cable that has a special pin-out. This is the typical networking cable used today; most computer shops sell it.

9. For a small to medium-sized network, consider using NetBEUI (NetBIOS extended user interface) as your default network protocol. This protocol makes networking easy to manage, and it lets you browse your network computers by name without any special tweaking as required by TCP/IP (Transmission Control Protocol/Internet Protocol).

10. If you have sensitive data on your computer that you don't want others to view, make sure you keep it in a folder on your hard drive, not shared to the network. □

Windows Security

Measures To Protect Your PC

You hear the news nearly every day: information has been stolen, malicious programs have been installed, and another computer's security has been compromised. The recent DDoS (distributed denial of service—an attack on a network computer that renders it unusable by deluging it with more requests than it can handle) attacks on various ISPs (Internet service providers) were launched by programs installed in secret on multiple computers, launched on the command of one person. After the attacks, users were left wondering if there's anything to do to prevent them.

Because we rely on technology for things that were unimaginable even a few years ago, we're shocked to hear a computer's security has been breached. However, while most users can run e-mail and word processing programs and play games, how many of us actually secure the access to our computers, much less the files on it? With a little time and effort, you can secure your computer pretty well. It may not fend off a determined intruder, but it will keep all but the most savvy computer users from accessing private files. We'll discuss how to secure a PC running Windows 95/98 (Win9x) and Windows NT or Windows 2000 PC.

Key Points

- You don't need to be running a server at a major search engine to have to worry about PC security. We have some general guidelines that will help you protect the data you have on your work or home computer.
- Networked PCs running Win2000 have greater security options available, especially on the administrative side. We'll outline the options from least to most restrictive, so you can decide how secure you want your shared network.

■ **Passwords.** Let's talk about the primary tool of security: passwords. Security is largely derived from setting, maintaining, and changing passwords as necessary, as well as limiting the resources a user is allowed to see by using password-protection. Passwords should be simple or common enough for you to remember, but difficult for anyone else to guess. We favor using themes, such as a favorite book or a movie character or title, or misspelling common words using phonetics, such as "rool" instead of "rule."

BIOS. All PCs come with a piece of software called the BIOS (Basic Input/Output System), which sets the boot process for the computer. Most BIOS' today offer a security option that lets the user set a password. Without entering the password, the computer cannot boot. The drawback, of course, is that on a shared computer, all users who access the PC need to have the password. We haven't seen a BIOS that permits separate, multiple-user passwords. Therefore options include either a single user knows the password and is "on call" anytime anyone wants to access the computer or all of the users know the password.

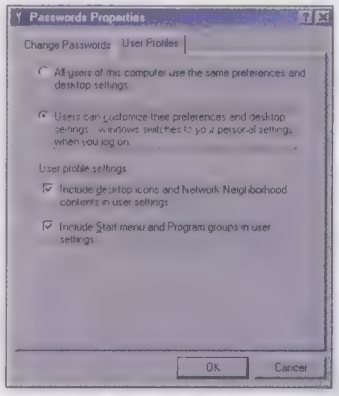
To enable the password through the BIOS, access it at system startup by pressing a specific key or combination of keys. Refer to the documentation for your PC for instructions, but typically, you'll see something similar to Press F1 For Configuration/Setup. The System Security option is usually listed on the first screen. Scroll down until you find it. Press ENTER, and in the System Security box, use your Down-arrow key to select Power-On Password. You'll be prompted to enter the new password twice. If you already have a password, you can change it or delete it here, too. After you enter you new password, save your changes and press ESC to exit back to the first screen.

You can bypass the BIOS by opening the case of your computer, locating the CMOS battery on the motherboard, and removing it for about 60 seconds; replace the battery and reboot. This will erase all old BIOS settings, including passwords.

■ **Win9x Security Options.** Win9x systems don't provide quite the same mechanisms for security that WinNT does. One difference is the logon, which is required for WinNT but not necessarily for a Win9x system. If your Win9x system is configured to show a logon prompt after boot up, you can simply press the ESC key at the logon prompt in order to bypass it.

(NOTE: In a domain-based network, pressing the ESC key at login will get you to a Desktop but not into the network.)

As the "Hitchhiker's Guide to the Galaxy" says, don't panic; you can create a more secure Win9x system. The first step is to make sure you require some sort of logon. If your computer does not log on to a network, you can set a Windows logon prompt. Click the Start button, Settings, Control Panel, and double-click the Network icon. Under the Configuration tab, click the Down-arrow under Primary Network Logon and select Windows Logon. Click OK, and you'll be prompted to restart your computer.


Passwords Properties
Change Passwords
User Profiles
All users of this computer use the same preferences and desktop settings
Users can customize their preferences and desktop settings
User profile settings
Include desktop icons and Network Neighborhood contents in user settings
Include Start menu and Program groups in user settings
OK
Cancel

Changing the User Profiles Settings lets users customize their Desktops when there are multiple users on the same PC.

Now there are two more options to help secure your computer. First, activate the use of Profiles on your PC and then install an optional program called Poledit, which lets a user create and use system policies, a more advanced security option.

To engage Profiles, open the Control Panel (click Start, Settings, Control Panel) and double-click Passwords. Use the Change Passwords to manage local and network passwords. Under the User Profiles tab, choose the Users Can Customize Their Preferences And Desktop Settings option and select both check boxes under User Profile Settings.

After you click OK, you will need to reboot. At the first login prompt, type the ID you want to have the highest authority on your computer (by default, you may use Admin or Administrator). Make sure you select a secure password and click Yes to the prompt regarding creating folders.

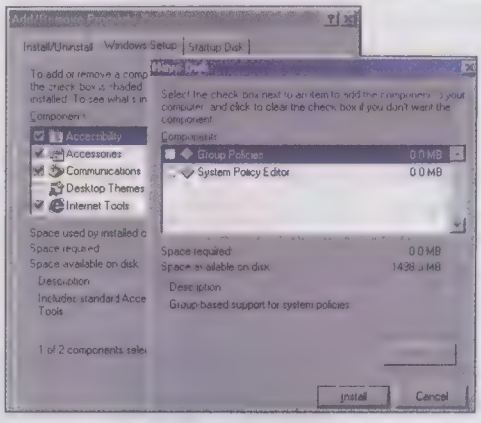
By enabling Profiles, anyone who logs on to your computer leaves a trail in the form of a folder with the username with which they logged on. This folder is stored in C:\WINDOWS\PROFILES\username, where "username" refers to the user who accessed your computer. Profiles can be preset for future (or current) users, by the master user, known as the Administrator or Admin. One advantage to presetting certain features in Profiles includes the ability to determine what programs can be used and what files can be seen on a user-by-user basis. Use Windows Explorer to add or remove programs under the C:\WINDOWS\PROFILES\ username folders.

Using one PC with User IDs and Profiles enabled, several people can have their own settings on it, such as Desktop wallpaper, Desktop icons, programs they can access from Start, Programs, and more. This can be a particularly useful option for parents trying to secure a PC for children to use because it limits potential damage to critical files.

■ System Policies.

However, profiles don't always go far enough. A savvy user who wants to exercise authority or access beyond granted parameters will find ways to view files or programs they don't have access to. Such users can alter their profiles, so they will have the access they want whenever they log on. To limit these users, and to further restrict your PC, implement system policies.

Create and edit System Policies using a tool called Poledit. The following instructions may seem a little complex, but take it one step at a time. To install Poledit, place your Win9x disc in the CD-ROM drive. Navigate to Start, Settings, and Control Panel. In Control Panel, double-click Add/Remove Software. Select the Windows Setup tab, click Have Disk, and then use the Down-arrow to scroll to your CD-ROM drive. In Win95, navigate to Admin, Apptools, Poledit and click OK. In Win98, navigate to Tools, Reskit, Netadmin, and Poledit. After you have navigated to the correct folder, click OK, and select Group Policies And System Policy Editor. Click Install and click OK. The Poledit program will be installed and can be accessed by going to Start, Programs, Accessories, System Tools, and System Policy Editor.



Once you've loaded the Poledit program, you can authorize or restrict access to folders, files, and other policy settings.

Once you log on as the administrator, or with the ID that has administrative rights, and have launched Poledit, click the File, New Policy. You will see two icons: a Default Computer and a Default User. Double-click the Default User icon. As you expand the trees in the window, notice the check box next to each option is gray by default, indicating that it will not be read when the policy is being applied. To implement each authority or restriction, click the checkbox to place a check next to the item. To clear the authority or restriction, double-click the check box to make it white.

To restrict user access to items in the system, go to the Shell, Restrictions section and check the first four that begin with Remove. Also select the last item, Don't Save Settings At Exit. Then, under the System, Restrictions section, click Disable Registry Editing Tools. If you are not selecting an item, it is best to clear it (double-click) instead of leaving it grayed out. Once you are done, select File, Save As, and type **Config.pol**.

You can create individual user policies by selecting Add User from the Poledit toolbar and entering the username of the account you wish to restrict. Double-click on that user's policy and edit the appropriate restrictions as outlined above. As long as you maintain the administrative access to your system, do not limit your account policies; as the administrator, you should have permission to everything. Don't be afraid to experiment with the various policy settings. As long as you have an ID that can log on and have Poledit and Registry editing access, you can reset other policy settings.

You should create a policy for each user who accesses your computer so you can set explicit limits on their authority while they are logged on. Sometimes, however, this may not be enough. You can bypass Win9x logons by pressing the ESC key, and new users can access a windows system by typing a new ID into the logon screen and answering yes to the Do You Wish To Create A Folder prompt. This will load a specific user profile that may not have restrictions implemented.

To minimize this potential security hole, log on to your computer by pressing the ESC key at the logon prompt. Launch Poledit again, and click File, then Open Registry. Set the attributes under Local User and Local Computer to restrict the things you want to lock down from nonauthorized users. Remember to save the work you do in Poledit. The Local User policy becomes the default policy for users logging on after it is created and modified.

■ Windows NT 4.0. For the purposes of discussing security issues with WinNT, we will limit our discussions to Microsoft WinNT 4.0 Workstation and Server. WinNT 3.x will not be discussed here, due to its relative obsolescence; Win2000 will be discussed later.

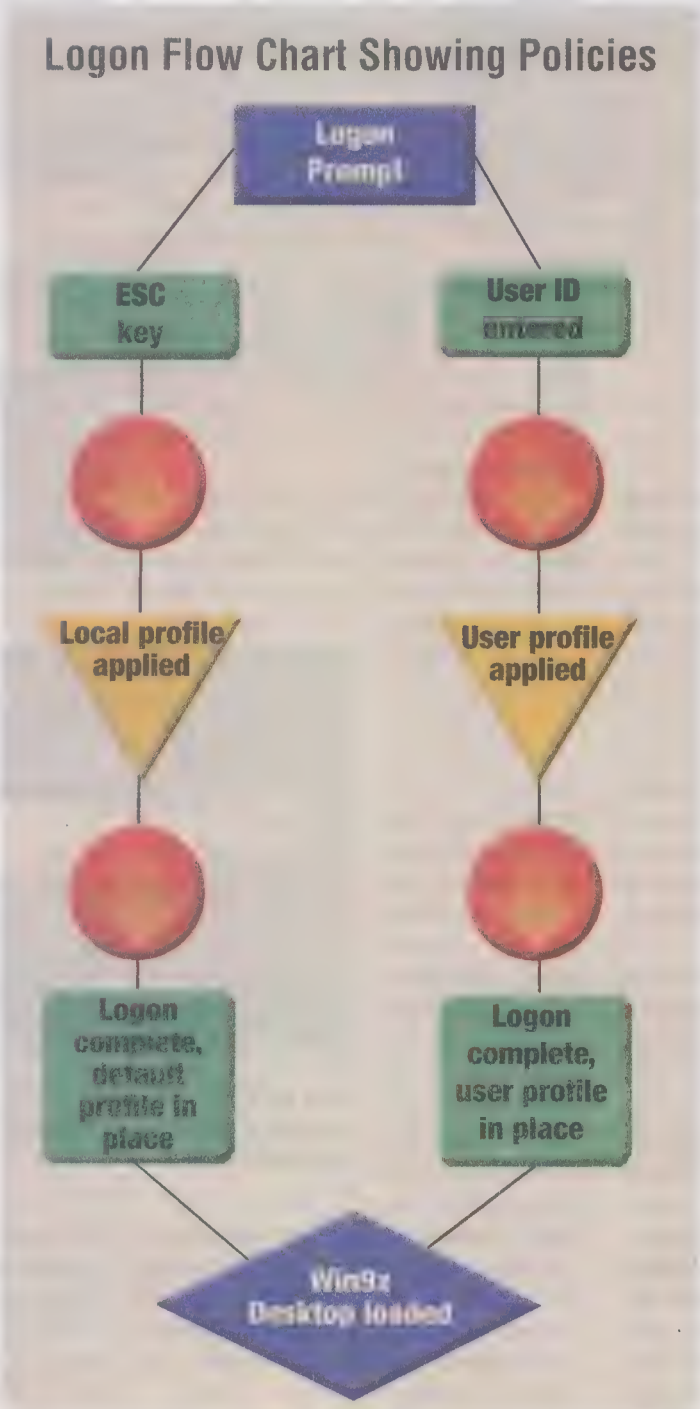
WinNT provides user security through mechanisms, such as Group membership and robust file- and partition-based security. The first step to secure a WinNT system is to make sure each hard drive partition is formatted (or converted to) NTFS (NT file system). WinNT recognizes two file systems: FAT16 and NTFS. However, file- and partition-based security is only available on NTFS. Essentially, you can set the security of a file on an individual, file-by-file, basis using NTFS.

In order to gain access to a WinNT system, you need to log on. There is no bypass for this logon. A user must have an ID that is recognized as valid by the WinNT computer they wish to log on to. User IDs are created locally on the WinNT Workstation computer by using the User Manager icon (Start, Programs, Administrative Tools (Common), User Manager. For WinNT Server, use Start, Programs, Administrative Tools (Common), User Manager For Domains, then change to the > domain to edit the local User ID or Group access.

In addition to having User IDs for system security, WinNT also provides another mechanism for security, known as Groups. Groups are sets of templates that provide varying levels of security and authority for their members. Users must be valid members of a Group to access folders and files on the system.

WinNT creates several default groups when it is installed. Examples include Administrators, Backup Operators, Print Operators, Users, and Power Users. Administrator is the highest level of authority available in WinNT. User is one of the least authoritative Groups, meaning that the User group cannot do a whole lot on a WinNT system (especially compared to the Administrator Group).

The key to using Groups for security is to carefully audit the membership of the Groups to ensure that users have the authority to do the work required of them but no more authority than they need. Group and User ID security in WinNT is based on the Least Restrictive Except Where Denied principle. This sounds more complicated than it is. To demonstrate: if Group A has permission to write to a certain directory on a system, then members of Group A will be allowed to do so when logged on to a machine. If a user is a member of Group A, which can write to this directory, and a member of a Group B, which has neither been given nor denied permission to do so, that user will be allowed to write to the directory. However, if a user is a member of Group C, which has been denied permission to write to that directory, that user will be denied the ability to write to the directory even if he or she is also a member of Group A. Remember: least restrictive permission applies, except where explicitly denied.



■ Windows 2000. Win2000 is the newest operating system (OS) released by Microsoft and is the next generation of the WinNT family. Win2000 implements new security mechanisms that were not present in previous OS releases, including a new security model based on the Kerberos system and a security mechanism called the Encrypted File System (EFS).

The Kerberos system uses tickets to handle security and authentication. Instead of comparing a hashed password to a file and assigning rights, Kerberos issues tickets that have a set expiration time and date and compares the tickets users present to determine the security. This reduces the flow of hashed passwords over a network, and creates a more robust security model that can be changed simply by revoking a users ticket.

EFS lets a user secure individual files or partitions on their hard drive with an encryption algorithm tied to the user ID. Briefly, EFS establishes its security through

public and **private keys** and is based on the user who sets the EFS attribute. There is a recovery system for Administrators to use in the case of an unrecoverable key, file, or user ID.

Both logically and organizationally, User- and Group-Management in Win2000 is handled much like NT 4. The mechanism for adding local users or groups to a Win2000 computer is the Computer Management icon, located in Computer Management (Start, Programs, and Administrative Tools). Expand the System Tools tree and go to Local Users And Groups. Select the appropriate subfolder, then in the right window, right-click and select New User from the drop-down menu. Fill out the form to create a user or group account.

Win2000 also offers a fairly simple way to edit Policies. Go to Start, Programs, Administrative Tools, Local Security Policy, then to Local Policies, and User Rights Assignment. You can edit the policies by assigning or removing User ID or Group ID to each policy for additional security.

Remember to limit Group membership to include only those rights that are absolutely necessary to performing the required duties of the user. There are descriptions included with each of the default Groups in Win2000, and it is a good idea to familiarize yourself with them so you can determine the levels required by the users accessing your computer.

■ **Windows 3.x & DOS.** There are, believe it or not, still a significant number of people running legacy Win3.x and DOS systems. This is a brief section, however, because both of these OSes suffer from a lack of internal security tools available. The best way to secure these systems, short of upgrading them to newer software, is to implement the BIOS level password discussed above or to invest in a third-party security package.

■ **Protect Your PC From External Intruders.** The DDoS attacks launched were the result of so-called **zombies** (hacked computers with software programs installed that were all activated at one time by their creator). How can you prevent this from happening on your computer? There are two primary ways to secure unauthorized remote access to your computer: by limiting the network connectivity to only what is needed or by installing personal firewall software on your computer. These precautions are becoming more necessary with the rapid deployment of always-on xDSL (all types of Digital Subscriber Lines) and cable modems.

Navigate to Start, Settings, Control Panel, and Network, and you can see a list of the network options that are installed on your computer. You need to know what components are necessary to maintain your dial-up access accounts or other network connections. If there is anything you see under the Network icon that is unnecessary, you can remove it by selecting it and clicking Remove. Be especially vigilant with File Sharing; it is superfluous on almost all standalone computers and can be a major security hole. Almost all changes here will require a reboot, but you can remove multiple items in one session and reboot just once. Keep track of what you remove; you might need to add it back if you run into problems.

Personal firewall software is gaining in popularity, security, and usage. There are several products available, including LockDown 2000 (http://www.lockdown2000.com), Norton's Internet Security 2000 (http://www.norton.com) and BlackICE Defender (http://www.netice.com). These products secure connections to and from your computer, and some scan for zombies that are currently installed.

■ **The Security Model** So, how secure is the OS that you're using? There are several indicators of secure systems such as restricted access to the shell (Desktop), required logon IDs, internal security tools that can be used to implement tighter security, and the ability to manage and control passwords. Additionally, NCSC (National Computer Security Center), a branch of the NSA, publishes the Orange Book, which specifies security attributes for various security levels. WinNT 4.0 Workstation and Server has a C2 rating, which is among the highest that can be achieved by a generally available OS.

WinNT and Win2000 are the most secure OSes we've discussed. By using the tools inherent in these two OSes, users can secure the resources on their local computer in a fairly straightforward manner.

Win3.x and DOS are the least secure OSes. There is little inherent ability to secure resources on computers running either OS, and the authentication methods used are either clear text or are easily cracked. DOS and Win3.x also suffer from their lack of support for newer software and hardware.

In the middle of the security model, you find Win9x systems. These ship with very open security, which must be tightened to gain any security benefit.

Computer system security is a constantly changing environment. As soon as new methods are introduced, people work to figure out how to defeat them. It is important to keep up to date on the security issues that we face in our respective environments. Just think about how much personal data you keep on your computer and how much of it would make you uncomfortable if it were made public.

This scenario is unpleasant, but unfortunately not far-fetched. By taking a little time, you can create a more secure computing environment for yourself. The tools outlined for use are available in the their respective OSes, and the average user can implement them to alleviate many of the security problems we face. LS

by Elliott Elrod

How Secure Is Your Operating System?

Security Attribute	DOS	Windows 3.11	Windows 9x	Windows NT	Windows 2000
Limit shell access			✔	✔	✔
Internal Security Tools			✔	✔	✔
Require Logon				✔	✔
C2 Rating				✔	

The Mobile Windows Picture

A Look At This Versatile System

Since Windows 3.0, the first truly successful version of Windows, was launched nearly 10 years ago, manufacturers of portable computers and Microsoft have been working together to create Windows to go.

Today there are three versions of Windows that are more or less mobile: Windows 98 (Win98), Win2000, and WinCE. Win98 is dominant in the consumer, small business, and end user space, with millions of notebooks running Win98 (not to mention its older siblings Win95 and Win3.x). Win 2000, aimed at the corporate and enterprise market as the latest version of WinNT, was officially launched in February 2000, and sold more than 1 million copies in the first month of its release. Like Win98, it has many features aimed specifically at the notebook user.

Interestingly, WinCE, a more compact operating system (OS) aimed at handheld computers, is the only one of the three that has yet to achieve dominance in its arena. An estimated 778,000 devices running WinCE shipped in 1999. Yet the Palm OS remains the leading handheld OS, with approximately 70% of the market share, according to IDC (International Data Corp.). The Palm OS is used on Palm and Handspring handhelds and on new generation cellular phones.

Let's look at what each of these Windows versions have to offer the mobile user.

Key Points

- Windows 98 and Windows 2000 are full-blown versions of Windows; however, applications written for Win98 and Win2000 will not run on a Windows CE handheld.
- WinCE handheld PCs are designed to work as *companions* to a Windows desktop PC. On the other hand, a Win98 or a Win2000 notebook is capable enough to serve as your *only* PC.
- Each version of Windows offers file synchronization and power management features important to mobile users.
- Don't try to run either Win98 or Win2000 with the minimum recommended installation requirements; try to get a notebook with a faster processor and add memory.
- Windows features, such as disk compression and screen magnification, can improve the mobile experience even though they're not specifically mobile.

■ Windows 98. Win98 is by far the most popular mobile version of Windows. And what makes it so popular among mobile workers is the fact that it's the exact same Windows OS that's on corporate and home desktop PCs. In other words, pretty much any desktop application will run on your Win98 notebook, and any file created on your Win98 notebook can be read by your Win98 desktop. As we'll see, this isn't necessarily so for WinCE applications and files.

According to Microsoft, to run Win98 Second Edition (SE), which is the current version, you need a PC with at least a 66MHz (megahertz) 486 processor, 24MB (megabytes) of RAM (random-access memory), some 260MB of free hard drive space, a CD-ROM or DVD-ROM drive, a VGA (Video Graphics Array) or higher-resolution monitor, and a Microsoft Mouse or compatible pointing device. You'll also need a 14,400Kbps (kilobits per second) or higher-baud modem for Internet access.

More realistically, you'll need a Pentium processor and at least 32MB of RAM (according to Microsoft, "more memory improves performance") to get Win98 and its applications to run right, not to mention a 56Kbps modem. According to Microsoft, "The better hardware and devices you have, the better your experience using Windows 98."

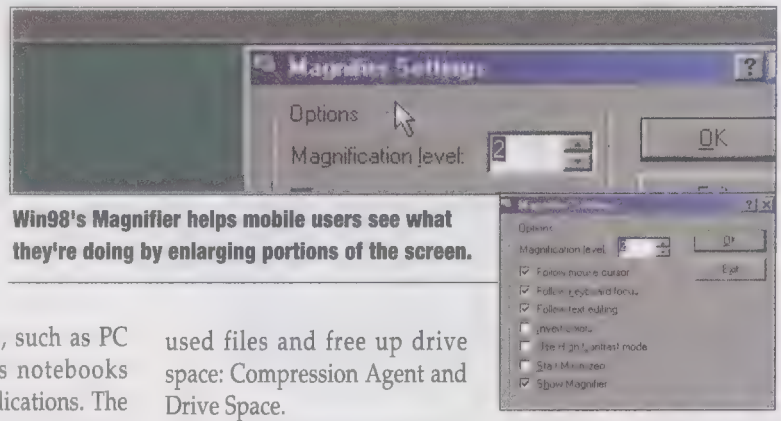
Mobile users get the benefit of Win98's support of many current PC hardware standards including USB (Universal Serial Bus), IEEE 1394, AGP (Accelerated Graphics Port), ACPI (Advanced Configuration And Power Interface), and DVD (digital versatile disc). Win98 also offers Multiple Display Support, letting users access multiple monitors from a single PC. This is particularly useful in presentations, which you can control from your notebook's LCD (liquid-crystal display) while making a presentation on an LCD panel or data projector. Win98 also includes a Backup Utility applet that supports SCSI (Small Computer System Interface) tape devices and makes backing up your data easier and faster.

Win98 also includes tools, such as Outlook Express and Microsoft NetMeeting, for on-the-road Internet communication and conferencing.

Another key feature for mobile users is Win98's built-in support for the IrDA (Infrared Data Association) standard for wireless connectivity. Almost every notebook

today ships with an infrared connection that lets users beam information to or from the notebook to printers, desktop PCs, PC networks, and handheld computers.

Mobile users will also like Win98's Screen Magnifier. Although not designed specifically for notebooks, it's one of a number of options in Accessibility Tools that helps people adapt Windows to their needs and preferences. The screen magnifier, designed to help people with moderate vision impairments, can also help notebook users see the smaller screens more clearly.



Win98's Magnifier helps mobile users see what they're doing by enlarging portions of the screen.

Win98 has some features that are designed specifically for mobile users. They include support for PCMCIA (Personal Computer Memory Card International Association) cards and enhancements, such as PC Card32 (Cardbus), which lets notebooks implement high-bandwidth applications. The Win98 OS also supports PC Card devices, such as modems and LAN (local-area network) cards, operating at 3.3 volts. This lets hardware manufacturers make lower power consumption devices.

Battery life and power consumption is a particular bugaboo for portable computer users. A recent survey showed that more than 90% of notebook users are dissatisfied with the length of their computer's battery life. Win98 includes built-in support for ACPI, which lets you switch on or off your PC as you would your television. Win98 also supports APM (Advanced Power Manage-ment) 1.2 extensions for more Power Management improvements.

Power Management, which can be opened from the Control Panel, lets you set the amount of idle time after which Windows will shut off your monitor and hard drive. Time increments go from After 1 Minute to Never, which shuts off all power management. Never is a good option if you're plugged into a wall outlet and don't want to be annoyed by the system shutting down. Power Management also includes Hibernate, which saves everything in memory to the hard drive when the system shuts down.

Win98 also lets you synchronize data between your notebook and your desktop PC through My Briefcase, a folder where you can drag all the files you want to keep up to date. Say you're going on a business trip for a week with your notebook. Take the files from your desktop PC, drag them to the folder, and transfer them to your notebook via diskette or network connection. When you return, transfer the Briefcase back to your desktop PC; Briefcase will let you know which files will be updated.

Another area where notebooks are a bit limited is in hard drive space. Win98 offers notebook users two ways to compress little-used files and free up drive space: Compression Agent and Drive Space.

Drive Space creates a host drive called a Compressed Volume File that lets the drive and all its application software look like the original uncompressed drive, except that it has about twice the amount of total storage space. While compressing data saves space, it also makes your hard drive run slower, so Drive Space lets you choose the settings that make the most sense for you. Compression Agent is similar but uses a more advanced algorithm than Drive Space, so the compressed files are smaller, freeing up more precious notebook hard drive space. However, uncompressing them takes longer, so your system seems to run slower.

Perhaps the biggest single mobile computing advantage of Win98 is that it's identical to the Win98 OS on your desktop PC, making everything work the same way. However, anyone familiar with Windows also knows that this means frequent rebooting when memory leaks and other problems result in slowed operation or system shutdown.

Windows 2000 Professional.

Microsoft Win2000 Professional is the latest OS for business desktop and notebook computers. According to Microsoft, "It combines the ease of using Win98—at work, on the road, or on the Internet—with the manageability, reliability, and security of WinNT." Many reviews have noted that the product is far more stable than Win98; one reader wrote that he'd already gone a week without rebooting. However, the product's installation requirements make Win2000 something of a tough sell as a truly mobile product.

To run Win2000, Microsoft says you'll need a 133MHz or higher Pentium-compatible CPU ([central processing unit] frankly, we'd hate to see anyone go through the trouble of loading Win2000 on a 133MHz Pentium and watch it crawl) with 64MB of RAM recommended as a *minimum*. You'll also need at least a 2GB (gigabyte) hard drive with a minimum of 650 MB of free space, due to Win2000's expanded size and habit of swapping data from memory to the hard drive and back again.

More realistically, this product is aimed at the server and power computing desktop market. According to Microsoft, for example, Win 2000 Professional supports single and dual CPU systems. Needless to say, dual CPU notebooks are as rare as a snowball in the Amazon. (If they existed, they would generate a considerable amount of heat.)

Win2000 costs more than Win98. A single copy costs $319, and upgrades from WinNT Workstation 3.51 or 4.0 will cost $149. An upgrade from Win9x is $219, but Win98 retails for $179, and the upgrade price, if you already have Win95, is only $89. If you're buying a new notebook running Win2000, you'll pay whatever the notebook manufacturer charges you. This is the OEM (original equipment manufacturer) price. The good news is that because the notebook manufacturer gets a break on the cost, the cost to the consumer for Win2000 when loaded on a new notebook should be considerably less than $319.

Still, there are many reasons to consider going to Win2000 for your next notebook purchase. In addition to its vaunted stability and crash-proofing, Win2000 Professional includes the Power Management found in Win9x and better remote-access support. Win2000 also bears a number of new and improved features for the mobile user. For example, Win2000 Professional lets mobile computer users work with the most current versions of their office files and subsequently synchronize those files with the network when they reconnect. Users can take any combination of files and folders offline, and

the files and folders appear in a local directory as they did online. While working offline, users can still navigate and browse shared folders and mapped network drives even though they are not connected.

The Win2000 Professional Plug-And-Play Manager automatically reconfigures the system. If like many users, you move between workplace environments (for example, from your co-worker's office into a conference room), you can use docking stations in each location to ensure that the transition is brief and seamless. This feature, known as **hot docking**, lets you dock or undock your notebook computer without changing hardware configuration or rebooting.

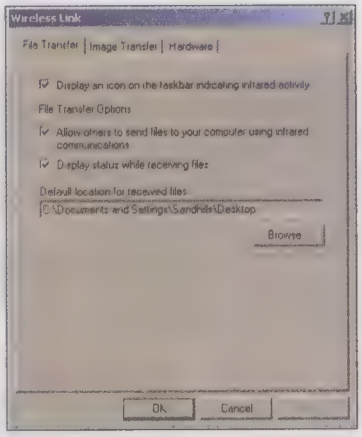
For logging on and off different networks or using the same device for multiple connections, the Win2000 Professional Network Connection Wizard lets the user connect to different networks in a single step, thereby automating the user profile setup and connection process.

Many of Win2000's mobile features are similar to those of Win98. Hibernate, for example, turns off your computer and monitor after a predetermined time, while saving your data to the hard drive. When you reactivate your computer, hibernate mode restores your programs and settings as you left them.

A new wrinkle in Win2000 is the Offline Files and Folders feature, which lets you disconnect from the network and work as though you were still connected. It also lets you create a mirror image of documents stored on the network on your computer. Similarly, the offline viewing feature makes available entire Web pages with graphics for viewing offline. You can view Web pages on your notebook when you don't have a network or Internet connection. And like Win98, Win2000 offers data synchronization, such as Synchronization Manager, which lets you compare and update your offline files and folders with those on the network. File Synchronization, which is often referred to as Intellimirror, is designed primarily to let notebook users download documents from a LAN and then work on them while disconnected from the network. Win2000 maintains two copies of the file, one on the notebook and one on the network drive. When the notebook is next connected to the network, Win2000 on the notebook compares the two versions and copies the offline changes back to the network.

The OS's Smart Battery feature is designed to give you a more accurate view of your battery's life and settings, letting you reduce power to specific functions to extend your battery's power.

RASes (remote access services) have been improved in both functionality and manageability. For example, users who have remote network access will be glad to hear of


Wireless Link
File Transfer | Image Transfer | Hardware |
Display an icon on the taskbar indicating infrared activity
File Transfer Options
Allow others to send files to your computer using infrared communications
Display status while receiving files
Default location for received files:
C:\Documents and Settings\Sandhills\Desktop
Browse
OK
Cancel

Win2000 users can enable an infrared data transfer through the Wireless Link in Control Panel.

Win2000's easier remote configuration wizards, which are designed to guide you through setting up remote access to a network or VPN (Virtual Private Network). When notebook users connect to the Internet through a network, Win2000 automatically locates the correct proxy server and configures Internet Explorer 5.01 to connect through it. Also, support for Wake-on-LAN means the system, potentially, can be powered up from a remote location.

The OS also provides more support for USB so you can connect and disconnect an array of peripherals, such as joysticks, scanners, and camcorders, without configuring or rebooting your notebook. If your notebook has the high-speed IEEE 1394, the new OS will support this higher-bandwidth connection for devices that require faster data transfer rates.

Notebook users will also benefit from IrDA support, which is designed to provide secure, wireless infrared communications between two Win2000-based computers. You can even use your computer as a (very expensive) Internet music player, because Win2000 now includes a decoder for MP3 audio. The CD player utility also boasts Internet support, so you can automatically retrieve information on songs and artists from online databases.

Most notebook computers today offer removable components to let users swap between diskette drives, DVD/CD-ROM drives, extra battery, etc. Win2000 supports removable storage devices, such as DVD and the Device Bay component swap standard for notebooks. If you're looking to add a new piece of hardware to your system, whether a printer, scanner, or other device, you may find it reassuring that Microsoft offers a wider range of drivers. It claims that more than 12,000 devices now support Windows Plug-and-Play functionality, which lets you automatically install new hardware with minimal configuration.

Notebook computers are easy to steal, as anyone who's lost one knows too well. And often, the data on your PC is more valuable than the hardware. Win2000 offers a number of enhanced security measures. First, you have to log on to the system to use it. You can give others access to files and printers on your system, but until you do so, they have no access. You can also specify which users have access to which files.

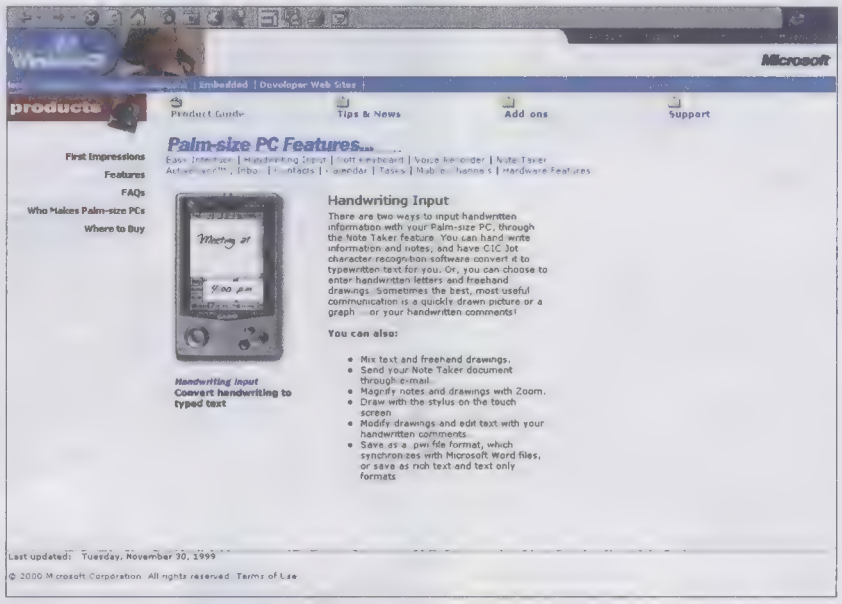
Mobile users will benefit from another security measure: Win2000's EFS (Encrypted File System). EFS lets you store encrypted files on the hard drive. Without EFS, if someone were to gain physical access to your computer, say, by the common scam of stealing your notebook from under the toilet stall in an airport, they could read data on the hard drive by placing the information in another PC. If you use EFS, the thief would need your log-on password to get the data. Don't forget your password; the encryption is supposedly uncrackable without the appropriate key.

■ **Windows CE.** As we've seen, Win98 and Win2000 are desktop OSes with similar features and the ability to run the whole universe of Windows application programs. WinCE is another kettle of fish. Officially launched in 1996, WinCE is the most mobile Windows of all. The Windows CE OS is designed to run on small devices with limited processing power, memory, and storage space, such as handheld PCs.

Essentially, Windows CE devices are designed as companions to Windows PCs, not as replacements. Most of these devices, such as palm-sized PCs and Pocket PCs, do not have a keyboard. The larger, Jupiter WinCE machines, similar in size to a notebook PC with a built-in keyboard, have not been a big sales success.

Portable PCs built around WinCE run slimmed down or pocket versions of the most popular Windows applications. These programs include Pocket Internet Explorer, Pocket Word, and Pocket Excel, as well as programs such as Microsoft Money for Pocket PC and Pocket Streets. WinCE pocket PCs also provide the typical organizer functions people want in a handheld PC, such as holding their address book and phone numbers, schedules, and a calculator.

As with Palm Computing's popular Palm, Windows Pocket PC users must enter information with a stylus by either scrawling on the screen or laboriously tapping an on-screen virtual keyboard. WinCE devices will not run Win98 or Win2000 applications, such as Microsoft Office, and WinCE applications aren't designed to run under Win98 or Win2000. For example, any Win98 notebook with Microsoft Office could download and open a Power Point file. You can neither download a big PowerPoint file to a WinCE handheld (no hard drive, little storage space) nor open it. (WinCE machines don't have Power Point.)


Microsoft
products
Product Guide
Tips & News
Add ons
Support
First Impressions
Features
FAQs
Who Makes Palm-size PCs
Where to Buy
Palm-size PC Features...
Handwriting Input
There are two ways to input handwritten information with your Palm-size PC, through the Note Taker feature. You can hand-write information and notes, and have CIC Jot character recognition software convert it to typewritten text for you. Or, you can choose to enter handwritten letters and freehand drawings. Sometimes the best, most useful communication is a quickly drawn picture or a graph ... or your handwritten comments!
You can also:
Mix text and freehand drawings.
Send your Note Taker document through e-mail.
Magnify notes and drawings with Zoom.
Draw with the stylus on the touch screen.
Modify drawings and edit text with your handwritten comments.
Save as a .pwi file format, which synchronizes with Microsoft Word files, or save as rich text and text only formats
Handwriting Input
Convert handwriting to typed text
Last updated: Tuesday, November 30, 1999
© 2000 Microsoft Corporation. All rights reserved. Terms of Use

Visit Microsoft's Web site for more information about Windows CE's newest features.

Instead, users can jot documents on their handhelds in Pocket Word or Excel, then transfer the files to their desktop or notebook to edit. Users can transfer documents by IRDA beam, by transfer cable, or by modem. Users can also use the included pocket version of Outlook to get their e-mail or the version of Internet Explorer to wander the Web by plugging in their handhelds to a modem.

Despite the compelling features of WinCE, many observers feel it's too complicated and too fat an OS for handheld PCs. The Palm OS continues to dominate in this market. Because of its failure to crack Palm's popularity, WinCE has suffered some major losses in the marketplace, as major manufacturers Everex, Phillips, and Sharp have ceased the manufacture of WinCE-based devices. Sony too, announced last year that it would use the Palm platform, not Windows CE, for future Net devices

■ **Windows CE Features.** Perhaps in response, Microsoft has changed WinCE's user interface to make it friendlier, faster, and more integrated. WinCE offers single-tap navigation throughout for faster actions and quicker response and the use of a start button for easy navigation. A File Explorer is now built in to provide an overview of all files, and there is also a built-in Shortcut or Task Switcher for quick access to the most recently used programs. The new WinCE has also done away with cascading menus, a true Windows trademark, which cluttered the screen on these tiny handheld devices.

Similarly, the interface offers an accelerated global find function and integrated voice and handwriting-recognition technology so users of PocketPCs can either scribble or say their thoughts for their machine to capture. Like the Palm's Graffiti, PocketPC offers Character Recognizer to help the machine turn your handwritten notes into text.

Also handy for portable applications is a battery life indicator, which shows the expected life of a rechargeable battery.

One of the most interesting enhancements in WinCE is that the latest version provides native support of Word and Excel attachments. While you still can't open a Power Point file, this feature converts Word or Excel e-mail attachments to Pocket Word and Pocket Excel formats. The user can view, edit (as much as is possible using a stylus), and save Word and Excel attachments if the handheld PC has a CompactFlash storage card.

Perhaps the most important WinCE programs for mobile users are its file transfer and synchronization features. ActiveSync 3.1 lets users control the amount and types of information transferred between the Pocket PC and the desktop. You can synchronize your calendar, for example, by sending the appointments you've set on your PocketPC's Calendar to the calendar in Microsoft Outlook on your desktop. The PocketPC also has a Backup/Restore option, which helps you use file transfer to back up the data on your mobile device. (Many handhelds suffer sudden data loss when the battery dies.)

WinCE can even add music to your Pocket PC, using the Windows Media Manager, in either the MP3 or WMA (Windows Media Audio) file formats.

Still, considering the limitations of the form factor, WinCE has been able to achieve some pretty good things. For example, Casio's new handheld multimedia Cassiopeia E-100 offers a color LCD screen with up to 65,536 colors. It lets you record messages and play them back, and it lets you use the stylus to jot down notes and convert them to a Microsoft Word document. The device also takes advantage of WinCE's AutoSync feature, letting you download your daily schedule and phone numbers from your PC to your handheld.

■ **Bottom Line.** Windows has come a long way as a mobile operating system. While it may still be too feature-rich and complex for small handheld devices, Windows delivers excellent performance and application management on notebook computers. Considering the size, power, storage, and performance limitations of notebook computers, it's no small compliment to the developers of this OS to say that Windows runs as well on a notebook as it does on a desktop. LS

by Michael Goldstein

Reinstallation Rundown

When & How To Reinstall Win95 & Win98

When fixing problems with the Windows operating system, you can try hundreds of tips before finding the exact problem solver you need. Pinpointing the exact solution definitely isn't always easy.

You might be able to use an error message to find the problem plaguing Windows, allowing you to fix it. Or a technical support person might be able to help fix a problem based on your description of it. Sometimes, though, Windows acts strangely for no particular reason. You might notice an overall system slowdown or more frequent system crashes, but you can't pinpoint the problem.

If something just doesn't seem right with your version of Windows, you can perform a procedure that sounds drastic but really isn't: reinstalling your version of Windows. Whether you're using Windows 98 or Windows 95, you can safely and effectively reinstall the operating system.

■ It's Time. If you're having easily identifiable, specific problems with your version of Windows, and you can fix them without reinstalling the entire operating system, we suggest you individually fix each one. Although reinstalling Windows is usually a safe procedure, it is lengthy and can cause a few changes to your computer's settings.

For instance, if you're missing a particular Win98 component, such as Media Player, you can install it through the Control Panel rather than reinstalling Windows. Click the Start button, Settings, and Control Panel. Double-click Add/Remove Programs and click the Windows Setup tab. Highlight the category containing the missing component—in this case, Multimedia—and click Details. Place a check in the box for the desired component by clicking the box and then OK. Windows will prompt you to insert your installation CD-ROM.

Even though not every computer problem warrants a reinstallation of the Windows operating system, it is a good solution if you notice an increase in the number of inexplicable system crashes or system quirks. Some Windows experts recommend reinstalling Windows on a periodic basis, as often as two to eight times per year. Reinstalling Windows in the same directory simply rewrites the basic system files and leaves the majority of your personal settings intact.

However, this isn't a widely promoted solution by Windows troubleshooters. The Microsoft Web site (http://www.microsoft.com), for example, doesn't suggest reinstalling Windows as a common solution for various system problems. Most Windows book authors don't discuss reinstalling Windows, either.

People who work with Windows on a regular basis, though, will tell you reinstalling Windows is, in most cases, a perfectly safe method of resetting the operating system's key settings and cleaning out stray Windows-related files that accumulate as you use your computer.

■ Preliminary Work. Before attempting to change to your computer's system files or its operating system, perform a backup of your hard drive. Even though reinstalling Windows is usually a safe procedure, it could cause a hard drive crash or the deletion of data.

To run the Win9x (Win98 or Win95) Backup programs, click the Start button, Programs, Accessories, System Tools, and Backup. Follow the provided directions to create a backup copy of your hard drive. If one is available, you could also choose to use a third-party backup program. Obviously, you'll probably want to store the backup copy on a CD-R (CD-recordable) or a Zip drive;

Key Points

- Reinstall Windows only after you have backed up your hard drive.
- Reinstalling Windows is a safe method for solving some quirky Windows problems.

backing up an entire hard drive to diskette could take several hours.

■ **Reinstall Win98.** If you choose to reinstall Win98, you'll need your Win98 CD-ROM, a blank diskette, and 30 to 45 minutes, depending on the speed of your computer. Win98 makes reinstalling easy because it does not give you a choice of where to install the operating system; it automatically installs to the WINDOWS directory.

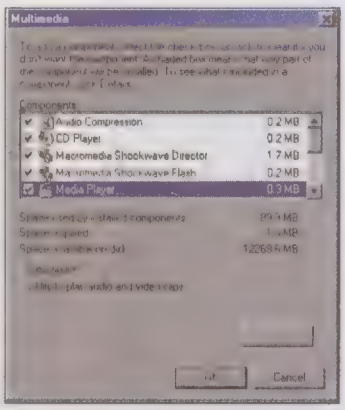
Follow these steps:

1 Close all open programs on your PC and click the Start button and then Shut Down. Reboot the computer to ensure you have a full allotment of RAM available. After Win98 restarts, insert the Win98 CD-ROM in the CD-ROM drive. Windows will probably open the Windows 98 CD-ROM window; just close this window by clicking the close button (the x) in the upper right of the window.

2 Click the Start button and then Run. Type the letter for your CD-ROM drive and the word "setup" in the Open field. For example, if your CD-ROM drive is the G: drive, type **g:\setup** and click OK.

3 The Windows 98 Setup screen will appear. On the left, the installation steps will display. Click Continue to begin.

4 Setup will run a quick test of your computer's hard drive (if you have partitions, the test runs on the C: drive) to ensure the installation can occur. You may receive a warning about antivirus software. If you haven't disabled your antivirus software, follow the directions in the warning to prevent problems. Click the Continue button. You also need to close all open programs. If you have already closed them, click the OK button.



It's best to fix problems without performing a reinstallation of Windows. For example, you can individually install missing Windows components .

5 The setup program will now take over. After a few minutes, choose whether you want to save your original system files. If you were performing an upgrade from Win95, we would recommend saving the original files, thereby giving you the option of uninstalling Win98 and returning to Win95. However, because you're reinstalling Win98, it isn't necessary to save the system files. Click No and Next.

6 You'll then need to select your country or region, which gives Win98 the ability to better tailor its Internet offerings to your needs. Select your country and click Next.

7 Next, create a startup disk. Even if you already have a startup disk available from your original installation of Win98, create another one. Diskettes fail from time to time, and if Win98 ever crashes, you won't mind having more than one working startup disk. Click Next, insert the diskette when prompted, and click OK.

8 Finally, you need to begin copying the operating system's files. In the Start Copying Files window, click Next.

9 Once setup begins copying files, you won't need to do anything unless the setup program discovers an error. As the setup program tells you, "Sit back and relax." From this point, the setup process will take 20 to 30 minutes, depending on the speed of your PC.

9a Don't turn off your computer during this phase of the reinstallation (and pray you don't lose power). Interruption during the file-copying phase could cause Win98 to be unable to resume the setup program or load improperly. During this phase, the program may ask you from time to time whether you want to keep a newer version of a particular file rather than install the one on the Win98 CD-ROM. Click Yes in each instance to keep the newer version of the file.

10 After five to 10 minutes, the setup program will automatically restart your computer. If asked during the restart, select to boot from your hard drive. After a few more minutes, the setup program will automatically restart the computer again. Although the setup program shouldn't need any input from you, it's a good idea to keep an eye on things during this phase.

11 Finally, Win98 will set up your Plug-and-Play hardware and finalize your system settings. This could take five to 15 minutes, depending on your PC. Win98 will then restart.

12 After this final restart, you should notice no differences from your previous Win98 configurations. You'll see a Welcome To Windows 98 window that gives you Win98 introductory tips. Remove the check mark from the Show This Screen checkbox and click the Close box in the upper right of the window. You have reinstalled Win98.

When Reinstalling Won't Work

Reinstalling Windows is a handy tool for cleaning up various problems that build up in the operating system as it runs. However, some problems you may encounter are too devastating even for a Windows reinstallation to fix. The following are good examples.

Hardware conflicts. If you have **IRQ (interrupt request lines**; communications routes reserved for interrupt signals, which tell the CPU to halt its present task and await further instructions) conflicts that prevent certain hardware components from properly working, or if you're using incompatible **device drivers** (software that allows hardware to communicate with your computer), you must individually fix each problem.

Software conflicts. If you're experiencing problems with Windows while running or after running one particular program, chances are that program is causing the errors, and reinstalling Windows won't cure them. You may want to reinstall the offending program instead.

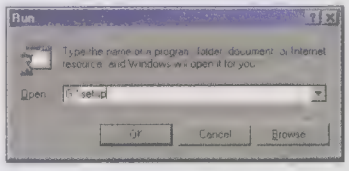
Hard drive errors. A hard drive that has physical errors or data errors may cause Windows to operate strangely, but because Windows itself isn't causing the problems, reinstalling Windows won't fix them. Use the hard drive maintenance tools described in the "Preventative Maintenance" sidebar for correcting such errors.

Corruption everywhere. During a reinstallation, Windows copies most of your personal settings from the original installation. Unfortunately, if these settings are causing the problem or are corrupted beyond repair, reinstalling Windows won't help. You may need to format your hard drive and start over, but you should do this only as a last resort. □

■ **Reinstall Win95.** When reinstalling Win95, you should encounter few problems, as long as you install it over the present version of Win95 in the same directory. Before the reinstallation, write down the exact name of the directory in which Win95 now exists (probably WINDOWS). You'll also need your Win95 installation CD-ROM and a blank diskette. The reinstallation process should take 30 to 60 minutes, depending on the speed of your PC.

Follow these steps:

1 Close all open programs on your PC, click the Start button, and select Shut Down. In the Shut Down window, click the Restart radio button and then OK to reboot the computer. This will ensure that you have a full allotment of RAM available. After Win95 restarts, insert the Win95 installation CD-ROM in the CD-ROM drive. Close the Windows 95 CD-ROM window if it opens by clicking the close (the x) button in the upper-right corner.



To begin the Win98 reinstallation process, type g:\setup in the Run window, as shown here, with your CD-ROM drive's letter replacing g.

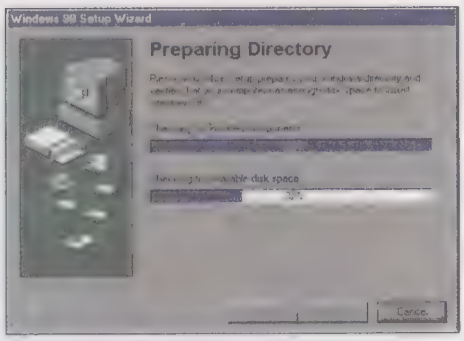
2 Click the Start button and then Run. In the Open field, type the letter for your CD-ROM drive and the word "setup." For instance, if your CD-ROM drive is the D: drive, type **d:\setup** and click the OK button.

3 The Windows 95 Setup screen will appear. Click Continue to start. The setup program will run a performance check on your system to make certain the system can handle installation.

4 After the system check, accept the Win95 software license agreement. You will then need to close all other programs. Click Continue to continue the reinstallation process.

5 You'll eventually reach the Windows 95 Setup Wizard window, where the actual copying of system files begins. Click the Next button. (This also marks your best chance to exit the setup program without causing any changes to your system. Click the Cancel button to exit.)

6 You must first select the directory in which you want to reinstall Win95. *It is extremely important that you select the same directory in which Win95 is already installed.* If you don't select the same directory, other programs installed on your computer may not run properly. If Win95 presently exists in the WINDOWS directory, click that button, followed by the Next button. Otherwise, click the Other Directory button, click Next, and type the correct path for your Win95 directory.



As part of its Setup program, Win98 will make sure your hard drive has enough free space to reinstall the Win98 operating system.

7 The Win95 setup program will then run another check of your system, making sure you have enough space to reinstall the software. You'll eventually reach the Setup Options window, where you can select the type of installation you want to use. We suggest the Typical installation. Click Next.

8 You will now need the product identification number from your Win95 materials. You can't install Win95 from the installation CD-ROM without this number. After entering it—along with all the appropriate hyphens—click Next. On the next screen, enter your personal information. You can leave the Company field blank, but you must enter something in the Name field. Click the Next button.

9 The Win95 setup program will now take a closer look at your computer's hardware after you click the Next button. Depending on the hardware configuration of your computer, setup may require several minutes to perform the analysis. This is also a prime opportunity for the Win95 setup program to lock up. If the Progress status bar fails to move for five or more minutes, and if your hard drive status light fails to indicate hard drive activity for the same amount of time, you will need to press the CTRL-ALT-DEl key combination to reboot your computer. Run Setup again and choose Safe Recovery if this happens.

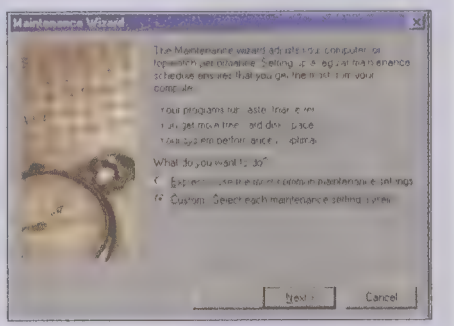
10 After the system analysis, select which Win95 communications options you want installed. You shouldn't need to reinstall any of these options

Preventative Measures

Unfortunately, reinstalling Windows won't solve every computing problem you may encounter. One way to avoid problems is to use preventative measures to make certain your computer and Windows continue to run in top condition.

Probably the best method for keeping Win9x (Windows 98 and Windows 95) running at its peak level is to keep your hard drive running at its peak level. Win95 offers ScanDisk, which scans your hard drive for physical errors, and Disk Defragmenter, which reorganizes your hard drive and eliminates fragments. To use either tool, click the Start menu, Programs, Accessories, and System Tools.

Win98 offers both ScanDisk and Disk Defragmenter, as well as a third tool, called DiskCleanup, which removes temporary files and other unnecessary files. All three tools are available by clicking the Start menu, Programs, Accessories, and System Tools. Win98 users also can ask Win98 to run each type of disk maintenance tool on a regular basis using the Maintenance Wizard, which also is available through the System Tools submenu. After clicking Maintenance Wizard, follow the instructions to set up specific times when Win98 will run its maintenance tools. □



The Win98 Maintenance Wizard will keep your hard drive in prime working condition.

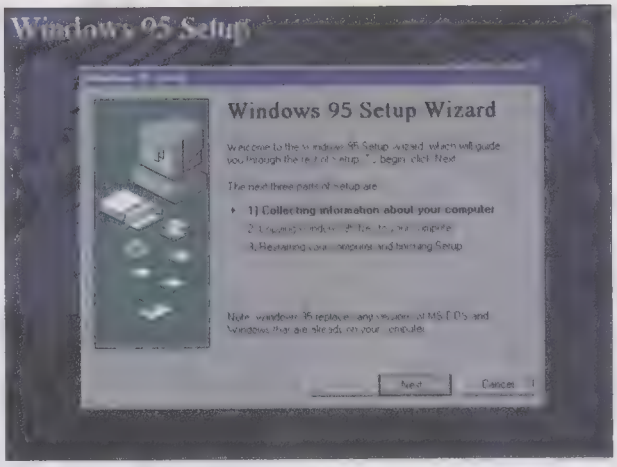
unless you're experiencing specific problems with them. Click Next. On the next screen, choose to install the most common components and click Next. You may then need to enter the name of your computer for networking purposes. Click Next.

11 Next, create a startup disk. Click the Yes button, click Next, and follow the directions.

12 To install the Win95 program files, click the Next button in the Start Copying Files window. As the setup program installs various files, you may need to decide whether you want to keep a newer version of a particular file than the one contained on the Win95 CD-ROM. Click Yes in each instance to keep the newer version of the file. The Win95 setup program will keep you appraised of the progress of installation through a status bar along the bottom of the window. You'll also see an Exit button in the lower-right corner of the window. However, we don't recommend exiting setup at this time because it could cause an overall system crash.

13 Following the file copying, Win95 Setup is ready to restart the computer. Click the Finish button. After the restart, Win95 will set up your Plug-and-Play hardware, Start menu, and Windows help programs. You'll need to verify the present time and your time zone. Click OK to restart the computer again.

14 Win95 will finalize its settings before opening the Welcome To Windows 95 window where you can find some basic information about Win95. Your Win95 reinstallation is complete.



The Windows 95 Setup Wizard will walk you step by step through the process of reinstalling the Win95 operating system.

■ **Inadvertent Changes.** After you've reinstalled Win9x, you should notice few outward changes to your system. For instance, your computer's display should keep its wallpaper, screen saver, color, and resolution settings. Even personalized settings you created earlier in the various add-on programs available through the Windows Accessories menu, such as in the System Tools menu or in any of the Windows games, will remain intact. For example, the settings in our Win98 Maintenance Wizard did not change.

Because you installed Win9x into the existing WINDOWS directory, the new version of the operating system will install over the older version of Windows. Your program and data files should remain intact, as well.

About the only major problems we encountered were with some strange quirks that seemed dependent on the PC itself. For instance, during one reinstallation of Win98 on a system with power-saving features, Windows kept intact our time of 20 minutes of inactivity for putting the PC on standby. However, we originally set the power button as the method for ending standby mode, but after reinstalling Win98, the power button setting was changed to cause the computer to shut down. In another reinstallation, this time with Win95, our default e-mail program encountered an error because a system setting was changed, but Win95 offered to fix this error for us, and the correction was successful.

We also encountered a few minor problems from a couple of programs. With one program, some of the icons disappeared, for example. However, we didn't encounter any problems we couldn't fix by reinstalling the software itself. The reinstallations of Windows didn't affect our data files.

Any changes you may encounter from reinstalling Windows will probably be at least slightly different from the changes we encountered, and that shouldn't be a big surprise. After all, everyone's Windows setup is slightly different because of the various personal settings everyone enables.

■ **Final Problems.** Reinstalling Windows may not solve all your computer's problems. If you have a major hardware conflict or a physical problem with your hard drive, reinstalling Windows won't fix it.

However, reinstalling Windows from time to time can potentially solve its quirky behaviors. In most instances, the benefits of reinstalling Windows outweigh the potential drawbacks, which are only slight annoyances. As long as you have a backup copy of your hard drive before beginning, your reinstallation should go more smoothly than the original installation did. LS

by Kyle Schurman

Installation Info

When should you reinstall?

- If you notice more frequent system crashes and slowdowns.
- If you notice quirks while using Windows.
- Two to eight times per year, according to experts.
- Only after you back up your entire hard drive.

What happens?

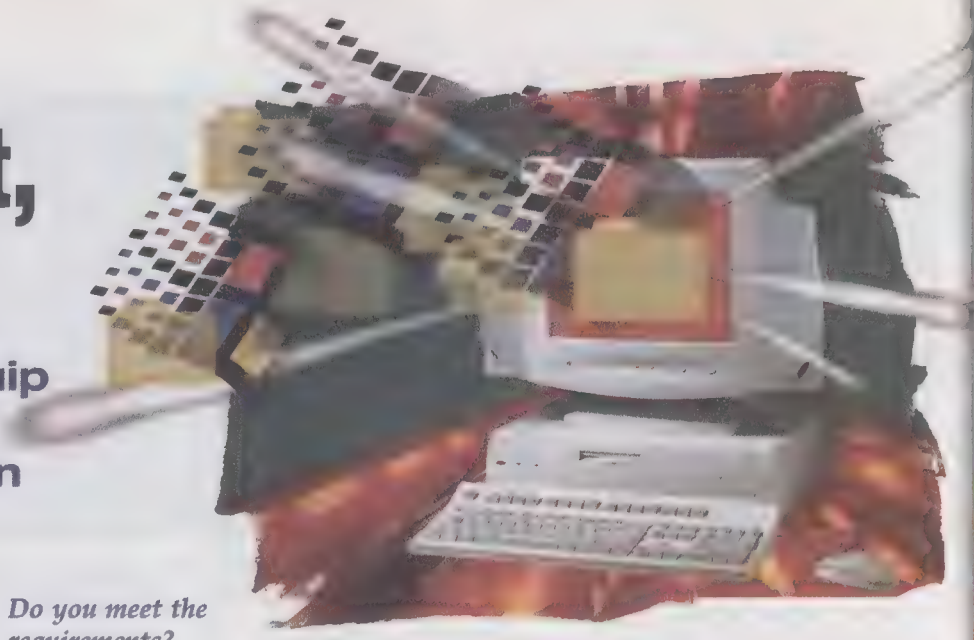
- System files are cleaned up and restored to original settings.
- Windows should run more smoothly with fewer system crashes.
- Some software could experience some strange quirks, such as disappearing icons or changes in settings.

What doesn't happen?

- As long as you reinstall Windows in the same directory, few outward changes occur.
- Most system settings, including display and startup settings, should remain intact.
- Major hardware and software problems unrelated to Windows won't be fixed, such as a physical problem with your hard drive. □

Ready, Set, Prepare

General Tips To Equip Your System For A Windows Installation



While Windows 95, Windows 98, Windows NT, and Windows 2000 all have slightly different installation procedures, in most cases you can get by with popping in the installation CD, answering a few questions, and sitting back and relaxing. No matter which operating system you're installing, though, there are some things you can do beforehand to make sure the installation goes more smoothly.

Do you really need it?

Don't install a new OS (operating system) unless you need its features or bug fixes. For example, Windows 98 contains drivers for more than 1,200 new hardware devices, many of which, including USB (Universal Serial Bus) and DVD (digital versatile disc), weren't available when Windows 95 first appeared. Upgrade from Win95 to Win98 only if you want to take advantage of the new hardware standards implemented in Win98, including the OnNow power management technology facilitating faster booting, USB, IEEE 1394 (FireWire serial bus interface), the Advanced Configuration and Power Interface, DVD read/write capabilities, and support for multiple displays.

Key Points

- Prepare your computer for an operating system upgrade.
- Find out why and how you should back up important files, scan your hard drive for problems, and defragment a hard drive before installation.

Do you meet the requirements?

To ensure a successful OS installation, your computer should meet or exceed the minimum hardware requirements specified by the new OS. Performance suffers if your system only meets minimum requirements. For example, Windows 98 requires a 486DX/66 with 16MB (megabytes) of RAM (random-access memory). But we wouldn't advise running Win98 on a system equipped with anything less than a 133MHz (megahertz) Pentium-level processor and 32MB RAM (64MB preferred).

Windows 2000 requires a 133MHz Pentium and 64MB RAM. Since more memory dramatically improves operation, we strongly recommend that you upgrade your computer's RAM configuration to 128MB prior to installing Windows 2000. Hard drive space is another consideration. You'll need many more megabytes than the amount specified by installation requirements if you also plan to retain your current OS as a backup.

Is it compatible?

Ensure that your applications and hardware are compatible with the OS you plan to install. When upgrading from Windows 3.x to Windows 95, download and install the Windows 95 Support Assistant, a free online Microsoft help file available at http://support.microsoft.com/support/kb/articles/Q134/3/63.ASP. Users considering an upgrade to Windows 2000 should download the Windows 2000 Readiness Analyzer (http://www.microsoft.com/windows2000/downloads) to determine if the computer and its installed hardware devices and software applications are compatible.

Always back up important files.

At a minimum, save existing MS-DOS and Windows system files in case you need to uninstall the newly installed OS and restore your original one. Windows 98 comes with Microsoft Backup, a free, full-featured backup utility. To access it, click Start, Programs, Accessories, System Tools, Backup. You can use the utility to back up all files, selected files, or only files that have changed since the last backup. When you elect to back up the WINDOWS directory, the utility also can back up the Windows Registry. Back up files to diskettes, a tape drive, or another computer on the network. If Microsoft Backup launches with the error message stating that no backup devices were found on your computer, but you have a backup device installed, click Yes to run the Add New Hardware Wizard and install the driver for this device. Click No to back up to diskette, Zip disk, or other removable medium. The Win98 Backup Wizard walks you through the backup process, letting you compress backup data to save hard disk space.

Win95 also comes with a backup utility, but it installs as an optional component during Setup. To run it, click Start, Programs, Accessories, System Tools, then click Backup. Choose the files or folder to back up. Select a destination drive and start the backup process. If it's not installed, click Start, Settings, Control Panel. Double-click Add/Remove Programs, click the Windows Setup tab, click the Disk Tools item, click Detail, then place a checkmark in the box to the left of Backup. Click OK, click OK again, then insert the Windows 95 CD-ROM as necessary. Win95 installs the Backup utility.

Windows NT 4.x also has a built-in backup program, but it backs up only to tape drives. (It does not support backups to removable media such as Zip disks or LS-120 drives.) If you have a tape drive on a system running NT, you must configure NT to recognize the device. Click Start, Settings, Control Panel, then double-click Tape Devices. Click Detect to direct NT to search for an installed tape drive. Click OK when it finds one. Follow on-screen instructions to copy the drivers from the installation CD. Restart the computer to use the tape drive. To back up to tape, insert a tape in the drive, click Start, Programs, Administrative Tools (Common), then click Backup. If you intend to back up a lot of data, you may have to use more than one tape.

Scan your hard drive for problems. ScanDisk (free with Windows 95/98) locates and fixes hard drive errors. It runs at Startup whenever you reboot your computer after a crash. It's the utility to launch if Disk Defragmenter halts in mid-process because of hard disk errors. We recommend running ScanDisk to check the integrity of hard drive files and folders before you upgrade to a new OS.

You can run ScanDisk by clicking Start, Programs, Accessories, System Tools, ScanDisk. Or double-click My Computer, right-click the drive you want to check, and click Properties. Select the Tools tab, then click Check Now (in the Error-Checking Status section of the Properties dialog box). The utility can perform two kinds of scans. Run it in Standard mode if you only want it to look for and fix errors in files and folders. Choose Thorough to search for and fix file errors and physical damage. It also verifies the integrity of sectors on the hard disk surface. Running ScanDisk in Thorough mode directs the applet to transfer data from bad or failing sectors to working sectors. In the process, it flags all bad sectors to prevent Windows from trying to write to them in the future.

Special options let you determine how ScanDisk handles **cross-linked** files (two or more files with clusters saved to the same physical area on disk), whether it deletes lost file fragments to free up hard disk space or if it converts lost file fragments to files that you can view with a text editor such as WordPad. ScanDisk also can check files for invalid file names, invalid dates and times, duplicate file names, and invalid compression structures on the host drive of a hard drive compressed with DoubleSpace or DriveSpace. By repairing these errors, ScanDisk minimizes potential data problems that can arise when installing a new OS.

Defragment your hard drive.

Whenever you use a computer, information you save writes to disk. Typically, hard drives try to write data in a contiguous stream to speed up information access. The less distance a drive's write heads travel when saving information to disk, the smaller the territory a hard disk's read heads must cover when retrieving data. Over time, however, hard disk data becomes fragmented. As your hard disk fills up and you repeatedly delete files or move them around from one folder to another, a hard drive begins to place data wherever it can, breaking up file information into sizes small enough to fill empty spaces between existing data. Once bits and pieces are in multiple locations, access and retrieval times increase. The hard drive heads must skip around the drive's surface to gather data clusters. Performance declines.

Disk Defragmenter (bundled with Windows 95/98) reorders the data on a hard

Points To Keep In Mind Before & During Installation

- When installing a new OS (operating system), anything can go wrong. Setup prompts you to make an Emergency Boot Disk or an Emergency Repair Disk. Follow on-screen instructions to do so. You'll need one or more blank diskettes for the job.
- When upgrading from one OS to another, if Setup inquires if you want to save your existing files in case you need to restore the previous OS, answer Yes. You'll give up hard disk space but safeguard your existing installation.
- Back up current files before upgrading so you can restore your current OS if necessary.
- Installation takes time and requires your input. If you're not in front of your computer, you can't answer periodic pop-up questions that appear on-screen during installation. Setup will halt.
- Don't begin an installation if you're in a hurry to be somewhere else.
- Programs that worked with the old OS may not work with the new one. Be prepared to visit the offending software's Web site to read tech support files and download an update patch, if necessary.
- You may need to update the driver for an installed peripheral so the device can work with the new OS. Visit the hardware vendor's Web site prior to installation to obtain any updates.
- Before installing a new OS, visit the OS vendor's Web site to see if there are tech support issues you should know about.
- The Windows 2000 Readiness Analyzer assesses your computer's hardware and software. It won't operate on dual-boot machines running Windows 95 or Windows 98 with Windows NT.
- Prevent software conflicts during setup. Turn off screen savers and virus-protection software before installing. (*NOTE: Installing a new OS changes the hard drive boot sector. Antivirus software prevents boot sector changes, causing Setup to fail.*)
- When installing Windows 98 from MS-DOS or Windows 3.x, edit your system's Config.sys file to remove any memory manager such as EMM386, QEMM, or 386MAX.
- Look for and read any Readme files on the installation CD prior to setup. These files often contain pre-installation notes vital to successful setup.

drive so that a file's bits and bytes are not scattered throughout the drive. When information is close together, the hard drive's read head spends more time handling data and less time spinning endlessly back and forth to access it. Data retrieval takes less time. Performance improves as the computer runs more efficiently.

We recommend that you defrag your hard drive before upgrading to a new OS. This lets the OS install its files in a contiguous stream. To defragment, double-click My Computer, right-click the drive you want to defrag-ment, then choose Properties. Click the Tools tab and click Defragment Now. Disk Defragmenter reorders file data to place it sequentially on disk. It also optimizes hard drive contents. When a utility optimizes, it moves the applications and data files you use most often to the most easily accessed cylinder locations. By placing "like" programs and their data close together, it minimizes seek time and maximizes access speed.

Get the service packs.

From time to time, Microsoft releases a service pack containing fixes, updates, and enhancements to files and applications. Microsoft has several available for Windows NT Workstation 4.0 and Win-dows NT Server 4.0. These service packs are optional rather than required, but they are frequently worth installing because they usually include updated hardware device drivers, in addition to bug fixes and feature enhancements. For example, Service Pack 6 for Windows NT 4.0 provides Year 2000 fixes, updates for Euro support, the NT Security Configuration Manager, and Microsoft Internet Explorer 5.

To maximize recovery of the computer in the event that a service pack installation fails, update your system's emergency repair diskette. To create a repair diskette, click Start, Run and type **rdisk** in the Open field. Press ENTER. The Repair Disk Utility appears. You can either create a new repair diskette or update an existing one. Update an existing diskette whenever you install new system software or device drivers, apply an NT service pack, or install Internet Explorer 4.x or later. Boot with the NT supplied emergency diskettes, then test the newly created repair diskette to verify that it works. Store multiple copies in safe places.

Other tasks you should complete before installing a service pack include performing a full backup (don't neglect Registry files) and disabling third-party drivers and services not required for startup. Once you install a service patch, *never* rerun Setup from the original NT 4.x CD. Reinstalling via the original Setup overwrites later versions of files and enhancements applied by the service pack. Moreover, if the last service pack you installed supported High Encryption, and the current service pack supports only Standard Encryption, Service Pack Setup halts in midstream, preventing you from continuing the installation. LS

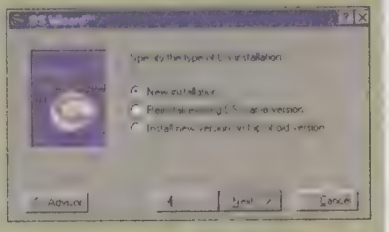
by Carol S. Holzberg, Ph.D.

Manage Your OSes With System Commander

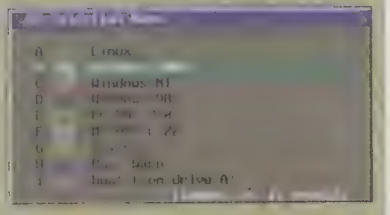
Windows users unsure of whether they want to commit to a new OS (operating system) should consider using System Commander 2000 from V Communications ($50 for download; $55 for CD version, includes $25 mail-in rebate; 800/648-8266; http://www.v-com.com).

System Commander, an OS manager, lets you retain your existing OS while you install as many as 100 additional OSes in primary and logical **partitions** (data containers that function like distinct and independent hard drives). System Commander bundles several powerful tools for partitioning a hard drive and manages up to 32 different FAT- (file allocation table) compatible OSes in a single primary DOS partition. It automatically partitions your hard drive for those OSes that must run in their own partition; the program can create, resize, move, copy, and convert partitions as necessary. Without it, you couldn't change existing disk partitions unless you deleted all data stored in that partition.

System Commander supports all PC-compatible OSes, including Windows 95, Windows 98, Windows NT, Windows 2000, OS/2, Linux, MS-DOS, PC-DOS, Dr-DOS, and others. (You cannot install from Windows 2000, Windows NT, or OS/2.) The program requires no resident memory, needs only 3MB (megabytes) of hard drive space, and automatically saves and maintains important configuration and hidden files for each OS. A graphical OS Wizard walks you through adding a new OS without overwriting your existing one. The Wizard recommends where to install the designated OS and advises you of the disk space required for installation.



System Commander 2000's OS Wizard walks you through adding a new OS without overwriting your existing one.



Use System Commander 2000 to install and run multiple operating systems from a single hard drive.

Setting up your hard drive to install another OS won't affect currently installed OSes. Simply launch System Commander, then follow on-screen instructions to choose the OS you want to install. The OS manager automatically preps your hard drive so you can install the desired OS at reboot. (If you want more control over installation, you can manually control installation and setup.) Before an OS starts up, System Commander presents you with a list of OS choices. Just select the OS you want to run. Press ALT-S to change the OS names or the order in which OS options appear on the list.

Should you ever want to uninstall System Commander 2000, a BackStep Wizard lets you review all actions performed by the OS Wizard and any manual partitioning you may have carried out with the OS manager. You can then select the operations you want to reverse and have the BackStep Wizard automatically perform those changes. □

©2000 Dazzle, Inc. Fremont, CA 94538

OVER THE MODEM AND THROUGH THE PORT TO GRANDMOTHER'S HOUSE WE GO.

DAZZLE™ THE EASIEST WAY TO SAVE, EDIT AND SHARE YOUR HOME VIDEOS.

Dazzle provides everything you'll need to get started—from hardware interface to video capture, editing and publishing software.

A face like this should be shared—and with Dazzle™ digital video systems it's never been easier. Starting at just $99, we provide everything you need to save, edit and share digital quality video using your own PC. Now you can send your custom videos to friends and family via tape, CD, e-mail or streaming video from your web site. To find out more or view an online demo, visit us at dazzledigital.com.

Available at Best Buy, CompUSA, Sears, Micro Center and other fine retailers.

Dazzle

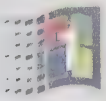
DIGITAL VIDEO ON YOUR PC

50 Ways To Speed Your Windows

Boost Performance & Minimize Work With These Tips

Microsoft Windows will not go down in history as being one of the faster operating systems of the computer era. While the operating system has evolved into a robust platform capable of meeting the needs of almost any user, its sheer size and comprehensiveness often leave it unwieldy and inefficient.

But Windows is flexible, and there are countless ways of fine-tuning the OS (operating system) to increase overall performance. These can range from sweeping hardware changes that affect the foundations of your PC to little shortcuts and handy tricks. Here are 50 of the best Windows pick-me-ups that hard-earned experience can provide.



Upgrade your RAM. More than any other component, RAM (random-access memory) is critical to Windows' efficiency. Essentially, it is the space in which your programs can move around and work. Running Windows with insufficient memory is like trying to assemble a car in a closet. These days 64MB (megabytes) is a standard amount, but more is always better. And try to get the fastest type compatible with your motherboard.

Key Points

- Hardware can limit an operating system, so keep your PC's hardware up to date.
- Make sure to keep current with all firmware and driver updates offered by your hardware manufacturers. Regularly check Windows Update.
- Either schedule or make a habit of running system maintenance utilities, especially ScanDisk, Defrag, and Disk Cleanup.

Upgrade your hard drive. Slow hard drives, or those with little capacity, can seriously harm Win-dows' performance. Buy the biggest, fastest drive within your budget; the newer ATA/66 (Advanced Technology Attachment) drives running at 7,200rpm (revolutions per minute) are good. And don't fill it up with a bunch of useless junk. If your hard drive reaches 50% capacity, start to consider either deleting material or adding a second drive. Hard drives at 90% capacity or more will decrease system speed and likely cause technical problems.

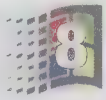
Upgrade your CPU. We mention this third because while CPU (central processing unit) horsepower may have a greater impact on Windows' speed in some situations, it has less impact on Windows' stability. Saving five seconds in processing time doesn't compare with spending five minutes rebooting your system after a crash. Still, your CPU platform is important. If you really want to jump-start Windows, use one of the newer Pentium III or Athlon models.

Consider overclocking. Intel doesn't endorse this practice, but most processors can tolerate at least a little bit of **overclocking**, in which you set the CPU to run at a faster speed than that at which it's rated. Heat is the most serious issue here, since faster speeds generate more heat, and excess heat may damage your chip and possibly the motherboard. You can find good resources on overclocking by performing a search at the *Smart Computing* Web site (http://www.smartcomputing.com), but remember to use overclocking with caution.

Upgrade your video card. An increasing number of new systems, especially "value" PCs, use video chips mounted onto the motherboard, many of which cannot be disabled for upgrading. For standard Windows use, such video arrangements are generally fine. However, users interested in 3-D applications, especially games, can see incredible performance boosts by using a current accelerator board with at least 8MB of video memory.

Go legacy-free. The trend in PC architecture is to eliminate antique ISA (Industry Standard Architecture) slots and slow serial and parallel ports. Switching to PCI- (Peripheral Component Interconnect) based cards and opting for USB- (Universal Serial Bus) based peripherals can seriously improve your overall performance.

Back up! No matter how many times computer users hear it, some of them just don't listen. All systems fail eventually. Someday, you will be forced to reinstall applications—Windows, maybe even your entire drive's contents. With a full system backup, such as to a tape drive, this process is simple and painless. Use automated scheduling so you don't have to remember to do it.



Consider a second hard drive for backing up. Backing up to a second hard drive is much faster than a tape system, and you can configure backup software, including the Backup utility within Windows, to save to the drive of your choice. By using a second hard drive, you gain speed and additional storage space for other archiving. The downside? Hard drives will be a bit more expensive, and the media is not removable.

Check for firmware and driver upgrades. Once you've invested all this money in fast hardware,

check back at the vendor's Web site periodically for software revisions that can help increase performance even more. Video cards are famous for driver updates, but even items such as CD-RW (compact disc-rewriteable) drives and printers get updates that boost speed and offer additional functionality.

Run Windows Update. Windows Update, accessed in the Start menu, whisks you to a Micro-soft support site, analyzes your PC, and assists you through the downloading of supplemental program elements, including critical ones that can offer virus protection, enhance security, or increase performance in other ways.

Get FATter. The original release of Windows 95 and earlier Microsoft OSes used a file structure called FAT16 (16-bit file allocation table). Ever since Windows 95 OSR2, consumer Windows (not NT) have offered the option of FAT32, which stores data in smaller, more space-efficient chunks and allows drive partitions of more than 2GB (gigabytes). Windows 98 comes with a format translator, located at Start, Programs, Accessories, System Tools, Drive Converter (FAT32).

Kick it with 32-bit. Today's Windows versions are predominantly 32-bit operating systems, although there is still some support for older 16-bit processes. However, 16-bit elements can substantially impact system performance, especially in device drivers. From Control Panel, open System and click the Performance tab. Look for the sentence: Your System Is Configured For Optimal Performance. This is good. Otherwise, you may see Some Drives Are Using MS-DOS Compatibility, which means Windows is doing the 16-bit mosey. Either update your Win-dows drivers or contact the offending device's manufacturer for a solution.

Spool EMF files to your printer. Often, Windows defaults to outputting, or spooling, data to your printer in raw format, which requires Windows to convert the data from your application to a printer-specific format. Switching to EMF (enhanced metafile) format converts your application data into a generic format, shifting the processing burden to the printer. To switch data formats, click Start, Settings, Printers. Right-click the printer icon, choose Properties, Details, Spool Settings. Use the pull-down option for Spool Data Format and select EMF.

Be font frugal. Look in Control Panel under Fonts and examine how many fonts you have available. Windows has to devote space to loading these. The more fonts you have, the more you may adversely affect Windows' performance. Consider moving unused fonts to a separate folder. Ideally, you should maintain fewer than 50 fonts in your main FONTS folder.

Optimizing drive performance. Windows uses look-ahead caching functions to help boost drive performance. You can fine-tune and/or maximize this caching by doing the following: Click Start, Settings, and Control Panel. Open System and click the Performance tab. Click File System and click the Hard Disk tab. Make sure the read-ahead optimization is set to Full. Under the CD-ROM tab, be sure your Supplemental Cache Size slider is placed at the largest setting and your access pattern is set for Quad-Speed Or Higher, assuming that fits your hardware description.

Change your role. Also under the Hard Disk tab, there is an option for Typical Role Of This Computer. If you have more than 16MB of RAM, set this to Network Server. This setting allocates more memory resources for your most recently used files.

Less color can mean more performance. Most applications and images don't require millions of colors of detail, especially on the Web where 256 colors is the norm. The more colors you elect to display, the more time it takes your system to compute them. To set your color mode, right-click an empty place on your Desktop and select Properties. Choose the Settings tab. Use the pull-down menu under Colors to select your mode. Typically, High Color (16-bit) is plenty.

Use Tweak UI. This is a utility package assembled by the Windows development team. Win95 users can download it for free from http://www.microsoft.com/windows95/downloads/contents/WUToys/W95PwrToysSet/Default.asp (it's part of the Power Toys). Windows 98 users will find it on their program CD under TOOLS\RESKIT\POWERTOY. Right-click Tweakui.inf and select Install. Tweak UI contains many performance enhancements, and you'll spend hours exploring all its nifty tools.

Ditch Temp files. Windows stores many of its working files under C:\WINDOWS\TEMP. Often, these files are left behind, consuming space and slowing the system over time. Periodically use Explorer to dip into this folder, sort the contents by file type and delete everything with a .TMP extension. There will likely be a handful you can't remove because they are currently in use.

A quicker Restart. You're probably often prompted to restart Windows, especially after installing a new program. Selecting Restart from the Shut Down menu will result in a warm boot, equivalent to having pressed the reset button on your chassis. However, this is usually unnecessary. After you've selected Restart, hold down the SHIFT key as you press OK. This will merely restart Windows, not the entire system, and save you a fair amount of boot-up time.

Get an uninstaller. Despite the install and uninstall wizards that accompany most of today's applications, most Windows configurations are littered with the discarded garbage of past applications. Over time, this can slow your system and cause instability. Use a program designed to monitor and delete software, such as Symantec's Norton CleanSweep (http://www.symantec.com).

Stabilize your swapping. Windows uses a hard-drive-based swap file to handle overflow when you exceed your memory resources. Give Windows a hand by forcing it to use a set swap file size, typically two to three times your amount of RAM. If you have 48MB of RAM, try a swap file size of between 100MB and 120MB. Click Start, Settings, Control Panel. Open System and click the Performance tab. Click the Virtual Memory button and set the minimum and maximum values as the same number.

Avoid memory leaks. Many applications fail to give back all of the memory resources they

commandeer while active. You can check the amount of memory lost to a program by going into Control Panel, then into System. Click the Performance tab. Observe the percentage of System Resources you have free. Then load your application, exit, and check your System Resources again. If you spot applications that cause substantial leaks, consider switching to alternative programs.

Use the System Monitor. When you want more precise information about how your PC accesses various components, turn to Windows' System Monitor. It's available under Start, Programs, Accessories, and System Tools. If System Monitor is not listed, you'll need to add it from your Windows CD-ROM by opening Control Panel and selecting Add/Remove Programs. Click the Windows Setup tab and select the System Tools option. Learning all the different readings System Monitor offers will take time, but the payoff in troubleshooting Windows bottlenecks is worth it.

Kick out the squatters. Press CTRL-ALT-DELETE to see a list of all the programs currently active, both visible and invisible. Those are all utilities and other applications associated with software you've installed, running in the background of Windows and sucking up memory. Most of these applications are unnecessary. Close any applications you don't feel are essential.

Downsize startup programs. To keep the squatters from reappearing next time you start Windows, go to Start, Programs, Accessories, then System Tools, and System Information. Select Tools, System Configuration Utility and click the Startup tab. Uncheck the items you don't want to load automatically when the system boots.

Scour with ScanDisk. ScanDisk searches your hard drive for errors and can not only repair faulty file structures, but also isolate defective platter media. You should run a thorough ScanDisk at least once a month. Find it under Start, Programs, Accessories, System Tools.

Defrag dynamite. Microsoft's Disk Defragmenter, also located under System Tools, packs all your data together efficiently and also puts your most-used data at the start of your disk, thereby optimizing your retrieval times. ScanDisk and Disk Defragmenter have been together since the DOS days, yet, incredibly, most people still neglect to use these tools on a regular basis. They're like doing the dishes and cleaning the counters—you just have to.

Keep it clean. Windows 98 adds a new essential utility to the bunch: Disk Cleanup. This handy application, located under System Tools, helps you wipe away the most common types of file detritus: temporary files, downloaded programs, and Recycle Bin contents. Under the More Options tab, you can also remove Windows components and other installed programs.

Give your brain a break. Most people only remember to run ScanDisk, Disk Defragmenter, and Disk Cleanup when there are signs of trouble in Windows. Maintenance Wizard (under System Tools) automates all these tasks for you, giving options on what features to implement and when to run them.

Clean the dark crevices, too. Over time, the Registry becomes cluttered with program fragments and corrupted data, potentially leading to reductions in performance or even an outright system crash. Download RegClean from Microsoft at http://support.microsoft.com/support/kb/articles/q147/7/69.asp and periodically run it to help fix unseen Registry errors.

Roll your own Taskbar Toolbar. In Win98, if you right-click an empty area in the Taskbar, you'll see an option for Toolbars and then an option for New Toolbar. From the New Toolbar dialog box, select the folder for which you want to make a toolbar or enter a URL (universal resource locator) for use as a toolbar. For this latter point, you'll need to be online and remember to use the full address, including http://. Once you make this URL's toolbar entry, you can right-click it, then select Open In Window to initiate your browser and go straight to the site.

Quick printing. To print documents without the bother of running their host application, go to Start, Settings, Printers and then drag-and-drop the printer on your Desktop to make a copy of it. Open Windows Explorer. Browse to the document(s) you wish to print, then drag-and-drop it onto the new printer shortcut.

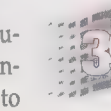
Get an extension. Often, you'll have several files with the same name and only differing extensions. For simplicity's sake, Windows often defaults to omitting these extensions, leaving you to ponder the meaning of the icon placed next to the file. To see the whole name and save yourself time lost to confusion and experimentation, try this: In Windows Explorer, click View, Folder Options, View. Make sure Hide File Extensions For Known File Types is not checked.

Come out, come out. While you're in the View options, make sure to set Hidden Files to Show All Files. Occasionally, you may have to edit or address a "hidden" file or folder, and not being able to see them can be annoying.

Use Documents. Why take the time to open your application and hunt for a recently used file you need to work on again? Click Start, Documents to bring up a list of your most recent projects. Select the file you want, and Windows will automatically launch the host application and bring up the file for you.

Less trash to recycle. Windows defaults to allowing up to 10% of your hard drive as a Recycle Bin receptacle. But 10% may be too much, especially when you're low on space and Windows is struggling. Right-click Recycle Bin and select Properties. Slide the maximum size slider lower to restrict the Recycle Bin's capacity. You may even wish to check the Do Not Move Files To The Recycle Bin option to immediately wipe deleted files from the drive.

Don't repeat yourself. Windows normally prompts you with a confirmation box every time you try to delete a file. At the bottom of the Recycle Bin Properties box is an oft-overlooked option: Display Delete Confirmation Dialog. Uncheck this.



Take the shortcut. Save yourself extra clicking by making Desktop shortcuts for both the

programs and documents you most often use. Not all programs create Desktop icons upon installation, so it pays to finish the job yourself. Open Windows Explorer, then merely drag-and-drop the document or application program file (typically ending in .EXE) onto the Desktop. You can delete these shortcuts by dragging them to the Recycle Bin.

40 **Trim some Start menu fat.** Most of us only use a handful of the items contained in the sprawling layers of fly-out Start button menus. Remove some of the extraneous entries (which won't remove the programs from your system) by clicking Start, Settings, Taskbar (or Taskbar & Start Menu in Win 98). Click the Start Menu Programs tab, then click Remove. Don't worry too much about over-deleting. You can always use the Add button to put entries back in.

41 **Find it.** Lost a file? Don't waste your time hunting for it manually; let Windows do it for you. Click Start, Find, Files Or Folders. On the Named: line, type in all or part of the file name you're looking for. By using the Look In: pull-down menu, you can elect to search across individual drives or all hard drives at once. Make sure to check the Include Subfolders option for best results.

42 **Find it again.** Don't have a clue about what that lost file's name might have been? Fear not. In Win98, the Name & Location tab of the Find dialog box also offers a field called Containing Text:. (This is located under the Advanced tab in Windows at person's name—John Smith, for instance—in the Containing Text: field and Windows will hunt for that text within your files.

43 **Improve typing accuracy.** Windows helps cut down on typing errors with FilterKeys, available through the Control Panel's Accessibility Options, Keyboard tab. The settings for FilterKeys let users screen out brief or repeated keystrokes.

44 **No-mess mouse trails.** Following your mouse pointer around the monitor can be difficult—particularly on laptops. Mouse trails are little ghost images that follow along behind your on-screen pointer, making the mouse's location easier to discern. You can enable and customize mouse trails. From Control Panel, open Mouse and select the Motion tab. Check Show Pointer Trails.

45 **Cutting in the printer line.** In a networked office, it's not uncommon to find your two-page memo sitting on permanent hold behind someone else's 50MB photo-editing projects. When you need to take cuts in the printer queue, go to Start, Settings, Printers and double-click your target printer. Click your print job and drag it in front of those ahead of you. Note that you can't bump in front of a job that has already started printing.

Tip 49: Windows may not always know the best programs to use with certain files, so tell it.

46 **A quicker shortcut.** Want to save a click? If you drag a file name over the Start button, Windows will open the Start menu. Then drag the shortcut to any spot in the top portion of the menu and drop it into position.

47 **Delete multiple devices.** Sometimes, Windows' Device Manager (under Control Panel, System) accumulates multiple instances of a given device. This can impact speed and reliability. To best eliminate these extras, boot Windows into Safe mode by restarting the system and pressing F8 repeatedly throughout the boot-up process. Choose Safe Mode from the menu. From Safe mode's Device Manager, delete all but one of the repeated devices.

48 **Keep drives active.** As much as we advocate "green" computing, you can save yourself hard-drive spin-up time by keeping the drive from going into power-saving mode. Go to Control Panel, open Power Management, and click Power Schemes. Set Turn Off Hard Disks: to Never. Note that the drive may have its own utilities that handle spin-down, as might the motherboard's chipset.

49 **Associate those file types.** Windows associates file extensions with different applications. By default, .WAV files, for instance, are associated with Windows' Media Player. After downloading some mammoth jukebox program, WAVs may be associated with that application, meaning you may need to load a massive multimedia powerhouse to make sure your Windows "ding" sound is still intact. Launch the right program for your purpose; Windows may not always have the best associations.

50 **Point-and-click is not always the fastest.** Windows is brimming with keyboard shortcuts, although few users are familiar with them. Here are our 10 favorites: (*NOTE: Older keyboards may not offer the Windows key.*)

1. **ALT-TAB:** Toggles between open applications. Keep the ALT key pressed down to view icons for all open applications, then tap the TAB key to move your toggle choice.
2. **CTRL-ESC:** Initiates the Start menu.
3. **ALT-PRINT SCREEN:** Performs a capture of the active window. Just paste it into your graphics editor.
4. **F10:** Activates menu selections, which you can then navigate with cursor control keys and ENTER. Very handy if your mouse is dead.
5. **SHIFT-DELETE:** Deletes items without sending them to the Recycle Bin.
6. **Windows key-M:** Minimizes all open windows.
7. **ALT-Spacebar-C:** Closes the active window.
8. **Windows key-E:** Starts Windows Explorer.
9. **CTRL/SHIFT-Windows key-V:** Increases/decreases speaker volume.
10. **CTRL-Z:** Undoes a previous action. LS

by William Van Winkle

The Windows Registry

Making Sense Of Its Keys & Values, Then Using Them To Benefit You

Even the most experienced Windows users can get a bit edgy when the topic of the Windows Registry comes up. For most people, it's not polite dinnertime conversation. For those who are new to Windows, it can be downright unsettling. While the Registry might be a little intimidating at first, conceptually it's quite simple. This article will try to help you get past any Registry phobia that might be lurking in the back of your mind. Learning about the Registry may not be as much fun as other computing tasks, but it might just open up a world of customization for your Windows operating system.

Why Make Registry Changes?

At first glance, it seems as if there are better ways to configure your Windows operating system and applications than poking around in the Registry. Take the applications in the Control Panel, for instance. For the most part, these are all simply front-end programs that manage the process of making changes to a small number of items stored in the Registry. Using these applications is the standard method for controlling much of your system configuration. They are preferred because by checking your input for errors, they help keep you from inadvertently corrupting your system settings.

So why bother with the Registry at all? Why not leave the Registry to the system and application programmers for whom it was created? There are three primary reasons why you should learn about the Registry.

First, the Windows Registry is the ultimate repository for all of your system's configuration information. By browsing through the Registry, you can explore all of the configuration possibilities within.

Second, there are certain configuration changes that you can only make by directly modifying the Registry. For instance, there is no Control Panel application that lets you edit the drop-down history list that displays in the Run dialog box (when you select Run from the Start menu).

Third, you might find out about specific system and application customizations that you want to try, but the directions are only given as Registry tweaks. To confidently make such changes, you need to understand the Registry so you can follow the directions correctly.

Key Points

- The Windows Registry contains configuration settings for the operating system and most programs on your computer.
- Making changes to the Registry enables users to customize many parts of their Windows system.
- The Windows Registry has a hierarchical, nested structure that is similar to a standard file system.
- Be careful when adjusting the Registry because there are no safeguards in place. It is best if you always back up your system, data, and the Registry before making any changes.

Registry Overview.

The Windows Registry was designed to replace the jumble of .INI configuration and start-up files that were littered across the typical Windows 3.1 computer. Win3.1 users can probably re-member the instability and chaos caused by having system files and device settings scattered all over their computer's hard drive. This arrangement was designed to provide system and application programmers with a place to store program configuration settings. Microsoft strongly discourages application developers from using .INI files in favor of the Registry-based configuration, so for the vast majority of newer applications, configuration information is stored in the Registry.

This effort has been successful. The Windows Registry has now become the central storage repository for all configuration data. This includes information about the operating system configuration, information for Win32-based applications, hardware configuration settings, networking setup data, and user preferences. The range of information captured in the Registry is staggering. Everything from your computer's Desktop color scheme to the contents of the recently used files listed in your word processor's File menu can be found in the Registry.

Warnings Ahead.

Before making changes to the Registry, you should be confident about the effects that the changes will have and make sure you have a working Registry backup. See the sidebar "Backing Up The Windows Registry" for instructions on how to create one.

Make sure you always perform any changes to the Windows Registry with care. At its site, Microsoft warns that making mistakes while editing the Registry can lead to

severe complications, including system instability. Because of this, Microsoft advises users to modify settings by using the tools in the Control Panel or System Policy Editor to make sure changes are entered and stored correctly.

Following this sensible advice will minimize the chances of making a regrettable mistake. And backing up the Registry before making changes will maximize your chances of recovering from such an unfortunate event. To see the full documentation and warning at Microsoft's Web site, visit http://www.microsoft.com/technet/Win98/Reskit/Part6/wrkc31.asp.

■ **Keys & Values.** A first foray into the Windows Registry can be a bit daunting. It contains a staggeringly large amount of information, the underlying structure is not immediately obvious, and the names of the primary keys (such as HKEY_LOCAL_MACHINE and HKEY_DYN_DATA) are not particularly friendly. Fortunately, we can help you overcome all these issues with some explanation and exploration.

The quickest way to understand the structure of the Registry is to compare it to something familiar. With the Registry, it has a hierarchical structure that is very similar to a standard computer file system. A file system has folders (or directories), and the Registry has **keys**. Folders and keys are alike in several ways. They each have a name and a distinct location. That location is specified by starting at the top of a hierarchical structure and naming each individual folder or key along a path to a specific key. For a Windows file system, the top-level folder is probably C:\, and you should be able to identify a folder named DAVE by following a path such as C:\PEOPLE\FAMILY\DAVE. In the Registry, a similar path might be HKEY_USERS\DAVE.

There are other similar parallels. It is possible to have multiple folders and keys with the same name, provided they appear on a separate path. For instance, the path C:\PEOPLE\NEIGHBORS\DAVE does not conflict with the path to the other DAVE folder (C:\PEOPLE\FAMILY\DAVE). Additionally, both folders and keys are containers. Folders contain other folders and files, while keys contain other keys and values.

Likewise, a file and a **value** are similar. They both have a specified name and exist within the context of their folder or key. Just as it is possible to have multiple files with the same name (in different folders), it is also possible to have multiple values with the same name—as long as they belong to different keys.

In addition, both files and values typically contain data. A file's contents are whatever an application program places into the file, while a value contains one of three types of data: a string, binary value, or DWORD. A **string** is simply a sequence of characters. **Binary values** are of most interest to programmers who write programs that use the Registry. **DWORD** values are numbers. The name "DWORD" is a legacy name that comes from "double word," which programmers use to refer to a number that takes up four bytes of space (or two words on older Intel hardware).

■ **Navigating The Registry.** Understanding the parallels between a file system and the Registry goes a long way toward making sense of the primary tool for navigating the Registry: the Registry Editor. To make the concepts of keys and values more concrete, open the Registry Editor. From the Start menu, select Run, type **regedit** into the field provided, and

Backing Up The Windows Registry

There are a number of ways that you can backup the Windows Registry. Deciding which method to choose depends on such factors as the version of Windows you have and what type of changes you are considering. It is helpful to think of three different types of Registry backup strategies.

The simplest strategy is an on-demand approach using the Registry Editor. The Registry Editor's Export Registry File feature (under the Registry menu) converts Registry settings into a text file. When backing up using the Registry Editor, you can choose to back up just a section of the Registry or its entire contents. If you anticipate making multiple, significant changes, be sure to select All as the Export Range in the Export Registry File dialog box. That way, if a change to the Registry turns out to be undesirable, you can simply double-click the exported Registry file to recover the old values.

It is a good idea to remove the exported Registry file after confirming that your changes are desirable. This prevents you from accidentally clicking the file in the future and wiping out all the changes you made since the file was created. Unfortunately, this simple method doesn't work for Windows NT; the enhanced security mechanisms in WinNT prevent you from being able to restore the complete Registry.

The next backup strategy is to use other tools that come with your Windows operating system to make a complete Registry backup. For those using Windows 98, it's possible to take advantage of the Registry backup tool: Scanreg. To create a backup with Scanreg, restart your computer in MS-DOS mode (an option in the Shut Down Windows dialog box). When your computer restarts, simply type **scanreg /backup** at the DOS prompt.

For WinNT, backing up the Registry is a bit more involved. Fortunately, you can create a complete Registry backup with the standard Repair Disk program. You will need to have a blank diskette, which will become your new ERD (Emergency Repair Disk), and locate the three Startup diskettes that came with WinNT. From the Start menu, select Run, then type **rdisk /s** and click OK. When the Setup window opens, agree to create an ERD by clicking the Yes button and follow the prompts to completion. Also, it's a good idea to include the date when making a label for the ERD.

The third backup strategy for the Registry involves getting professional help. There are many commercial products that are specifically geared toward keeping your Registry backed up. The WinRescue family of products (http://superwin.com), for example, is an inexpensive choice. On the more expensive side, GoBack from Wild File (http://www.goback.com) is an award-winning product that provides a unique disaster recovery solution that is worth checking out. □

click OK. You should see the Registry Editor window display on-screen.

The Registry Editor displays two panes, one on the left representing the hierarchy of keys in the Registry, and one on the right representing the values that are contained by the currently selected key. Keys that contain other keys have a small square beside them with a plus sign (+) inside. Click one to expand the current key and see the other keys it contains.

In many respects, the Registry Editor looks similar to the familiar Windows Explorer window that users often use to browse through system folders and files. In fact, the Registry keys even display on-screen with a folder icon next to their name. In the left pane of the Registry Editor, you'll see the top-level keys: HKEY_CLASSES_ROOT, HKEY_CURRENT_USER, HKEY_LOCAL_MACHINE, HKEY_USERS, HKEY_CURRENT_CONFIG, and HKEY_DYN_DATA. All configuration information is stored within these keys. Finding a specific piece of information requires navigating to the key that contains the value of interest.

For example, on some systems, if you want to see all the color settings for the default user, double-click HKEY_USERS, .DEFAULT, CONTROL PANEL and then COLORS. After opening the COLORS key, the right pane should display all the values that contain the color settings for the default user. The names of the values, such as MenuText and ButtonFace, describe where each setting applies. These are string values containing numeric entries, between 0 and 255, describing the intensity of the red, green, and blue components of each color. Microsoft Windows uses these color settings to display the user's screen.

This is only an example of how to navigate through the Registry, though; the recommended way to change color settings is through the Display icon in the Control Panel (Start, Settings, Control Panel). For specific examples of how to change settings in the Registry, see the section in this issue that corresponds with your operating system. The Windows 98, Windows 95, and Windows NT sections each contain an article about the Registry (as it relates to that particular operating system).

When it isn't practical to start at the highest-level key and click your way down to a value that you want to examine or change, use the Registry Editor's search tool to quickly find what you need within the Registry. Click Find from the Edit menu (or press CTRL-F) to display the Find dialog box. Next, type the name of the key or value that you are searching for in the field provided.

In some systems, you'll also see options next to each checkbox below Look At to help you narrow down where the program will search. In general, it's a good idea to check only one of these options unless you are unsure about whether you're looking for a key, value, or data. In addition, clicking the checkbox labeled Match Whole String Only is useful when you know the complete and exact name of the item for which you are searching. Click the Find Next button to start the search.

The Registry Editor stops searching at the first match it finds and highlights the associated key or value. Press the F3 key to resume searching from the current location if the result is not what you wanted. If the search highlights a value in the right pane, but there are numerous keys displayed in the left pane, it can be difficult to determine which key contains the value that was found. Look for the open folder icon to locate the correct key.

Finally, remember to be careful when using the Registry Editor. Unfortunately, it lets you delete critical configuration items. It has no undo feature. Plus, it will not ask you to confirm your changes, nor does it perform any type of error checking of the values you do insert. Still, it is the standard tool for navigating your Registry, and by following the information in this article, you should be able to explore it safely. LS

by C. Reid Turner

Restoring The Registry

If you ever get into trouble tinkering with the Windows Registry, you'll suddenly come to appreciate the importance of your Registry backup. You did pay attention to all the warnings and make a backup, didn't you?

An important part of any backup process is to make sure you can actually restore the system to its previous state using the backup you created. This certainly holds true for the Windows Registry. You should be sure that you both understand how to restore the Registry from your backup and that you actually can restore it. Taking the extra step of checking this crucial factor can be the difference between safety and agony.

How one restores the Registry naturally depends on the method used to back it up. In the "Backing Up The Windows Registry" sidebar with this article, we covered three approaches that reflect the most common Registry backup methods.

If you backed up the Registry using the Registry Editor to create a .REG file, simply locate that file within Windows Explorer (right-click Start and select Explore) and double-click it. Before doing so, however, make sure you have the right file. Plus, make sure that you actually want to undo the Registry changes. After double-clicking the file, you should see a message window display that confirms your changes.

If you used the Scanreg program, then restoring the Registry is simple. First, restart Windows in MS-DOS mode. Then, at the DOS prompt, type **scanreg /restore**. Next, when you see a list of available backups, select the one you want to restore and press the *R* key on your keyboard. After restoring your Registry, you can reboot to start Windows, or you can simply type the **win** command to start Windows.

Restoring from the Windows NT ERD (Emergency Repair Disk) is also simple. This method has the benefit of working even when you are unable to boot WinNT. Start by putting the first of the three WinNT setup diskettes into the diskette drive. When your computer boots up, click Repair. Next, select Registry, and choose the parts of the Registry you want to restore. This process will then restore these parts to their condition at the time you made the ERD.

If you choose a third-party product to help with your Registry backup, you should find plenty of documentation regarding the restoration process. It's a good idea to prepare yourself and become familiar with this information before you actually need it. □

Standard Applications

Tips For Using The Built-In Programs In Win95, Win98, WinNT & Win2000

When the need arises for a particular software function, most people instinctively want to purchase a full-fledged program, regardless of whether they could survive just as well with a bare-bones product. Instead of heading out to your local software store to find an application that will meet your needs, you can look much closer to home for the solution: in your Windows operating system.

Each version of Windows, whether it's Windows 95, Windows 98, Windows NT 4, or Windows 2000, contains several built-in programs called **standard applications**. They provide basic features without the need for third-party software. These standard applications cover a wide range of computing functions, including word processing, editing images, and taking a break from work. You can find most of them in the ACCESSORIES folder.

Unfortunately, most of the offerings haven't changed much from when Microsoft first introduced them with the Windows 3.x operating environment. (Microsoft introduced a few others with Win95.) In addition, most of these applications contain the same original features they had when they came out in Win3.1 and Win95, meaning some of the standard programs are no longer as useful as they once were.

Still, each program has some unique features that make it a handy option for performing certain tasks. We'll give you some key tips and advice for making the most of these standard applications.

(NOTE: Unless otherwise stated, each set of directions applies to all four versions of the Windows operating system: Win95, Win98, WinNT, and Win2000.)

Key Points

- Look to your Windows operating system to find standard applications, such as a word processor, instead of your local software store.
- Use the software included with Windows to perform many day-to-day functions.

■ **Calculator.** The Calculator program works like a handheld calculator, letting you perform mathematical functions on values. To open Calculator, click the Start button, select Programs, click Accessories, and then select Calculator. You can operate the calculator by clicking buttons in the window or by typing keyboard equivalents.

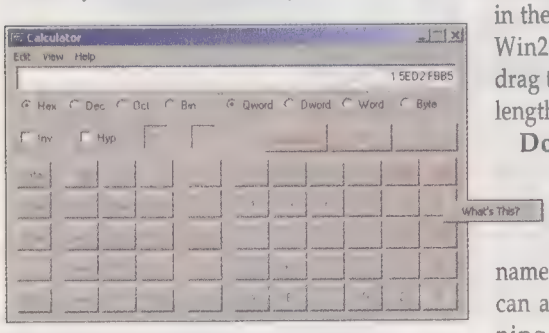
Copy the answer. Unlike in grade school, it's OK to copy an answer from the Windows Calculator. Once you've calculated an answer, you can copy the result from the Calculator window and paste it in nearly any type of other program by clicking the Edit menu and Copy in Calculator and then pressing CTRL-V in the other program.

Inserting commas. Win2000's Calculator gives you the ability to insert commas into large numbers, making them easier to read. Click the View menu and the Digit Grouping command to automatically have the calculator insert commas in the appropriate places. (Win95, Win98, and WinNT don't offer Digit Grouping with the Calculator program.)

Keyboard matches. As long as you have the NUM LOCK toggle key activated on your keyboard, you can use the numeric keypad to enter data rather than clicking each number on the calculator's on-screen keypad. *(NOTE: You will know if the NUM LOCK key is on if the Num Lock option, which is located above your keypad, is lighted up.)* The additional keys for the on-screen scientific calculator have equivalents on your keyboard, too. In any Windows version, click the Help menu, Help Topics, Tips And Tricks (from the Contents tab), and Using Keyboard Equivalents

(Win95 and WinNT) or Use Keyboard Equivalents Of Calculator Button (Win98) to see the scientific calculator's keyboard equivalents. In Win2000, you just click Use Keyboard Equivalents Of Calculator Button; you don't have to select the Tips And Tricks option.

Switching views. When you switch between the scientific and standard calculators, Win98, WinNT, and Win2000 automatically clear the value from the Calculator window. If you want to save the value, use Calculator's memory features. With the value displayed, click the MS button, which will place the value into memory. Next, click the View menu and the type of calculator you want to use. Win98, WinNT, and Win2000 will reset the value to zero, but they will retain the memory value. (Win95 doesn't reset the value to zero, and sometimes WinNT doesn't clear the value.) Click the MR button, which recalls the number you stored in memory, to display the value in memory. If you are working in a value format other than decimal in the scientific calculator, Windows will make the automatic conversion of your value in memory.



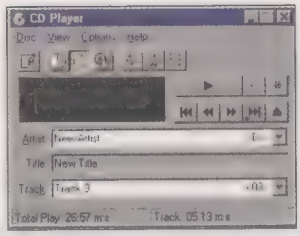
Right-click any button in the Win2000 Calculator window and click What's This? to view an explanation of the button.

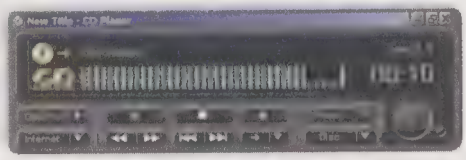
What does this button do? If you're confused by any particular Calculator button, right-click the button and click What's This? in the pop-up menu. Windows will display an explanation of the button's function. If you want more information about the calculator, select the Help topics command from the Help menu.

CD Player.

The CD Player program lets you control how Windows plays audio CDs inserted in the CD-ROM drive. You can personalize the settings of any audio CD, including the tracks you want to hear and the order in which they're played, making the CD play differently under Windows than it does in your regular CD player. In addition, Win2000's CD Player received a modern upgrade to its interface, giving it a pleasing new look.

To open CD Player in Win98 or Win2000, click the Start button, Programs, Accessories, Entertainment, and CD Player. For Win95 or WinNT, substitute the Multimedia submenu for Entertainment submenu. If you have AutoPlay enabled, CD Player will automatically start whenever you insert an audio CD.





CD Player in Win2000 (on the left) has undergone a major change from the Win95 CD Player (below).

Bits and pieces. You can hear the first few seconds of each song on your CD by clicking the Options menu and Intro Play in the Win95, Win98, or WinNT CD Player window. In Win2000, click the Mode menu button, which is in the fourth column from the left in the bottom row. Select the Preview command. CD Player will then play a portion of each song in order on the CD before moving to the next song. You can set the exact amount of Intro Play time Windows uses. Click the Options menu and Preferences. In Win95, Win98, and WinNT, enter the amount in the Intro Play Length box and click OK. In Win2000, click the Player Options tab and drag the slider bar to change the introductory length of time.

Download CD data. When you start Win2000 CD Player, you will be asked whether you want to connect to the Internet and download the artist's name and information about each song. You can also find music information while running Win2000 CD Player by using the Internet menu. (The CD Player program in Win95, Win98, and WinNT doesn't offer these Internet-related features.)

Enter CD data. Windows can store information you enter about your audio CDs, such as the artist's name or the title of each song on the CD. The next time you place the CD in your CD-ROM drive, Windows will display the information in the CD Player window. In Win95, Win98, and WinNT, click the Disc menu and Edit Play List. In Win2000, click the Options menu and Playlist. Highlight the disc and click Edit Play List. Highlight an individual track to type its name. Through this window, you can also edit the order in which the Windows CD Player will play the tracks. You can even eliminate some tracks.

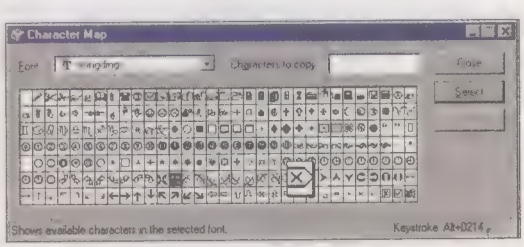
Play songs randomly, continuously. The CD Player window lets you control your audio CD in the CD-ROM drive as you would control an audio CD in a stereo; you can do such things as continuously playing the CD or randomly playing the tracks on the CD. In Win95, Win98, and WinNT, click the Options menu and place check marks next to the commands you want to activate by clicking them. In Win2000, click the Mode menu button, which is in the fourth column from the left in the bottom row, and select one of the commands from the drop-down menu that appears.

Stop AutoPlay. When you insert an audio CD in the CD-ROM drive, Windows automatically begins playing the first track on the music CD and opens (and minimizes) the CD Player window. You can easily disable AutoPlay for a particular CD, though. Hold down the SHIFT key for several seconds while closing the CD-ROM drive door. You then will need to open CD Player before you can begin listening to the CD.

Use volume controls. The new CD Player interface in Win2000 offers volume control and mute buttons in the lower-right corner of the window.

Character Map.

The Character Map program provides Windows users with access to characters not normally available in



Try using the Wingdings font in Win95's Character Map to see various symbols you can insert in your documents, e-mail, and more.

a standard keyboard layout. Character Map lets you insert rarely used symbols or foreign language characters into a document or e-mail message, for example. To open Character Map in Win98 and Win2000, click the Start button, Programs, Accessories, System Tools, and Character Map. In Win95 and WinNT, Character Map is in the Accessories submenu.

Insert a character. In the Character Map window, select the font you're using in your document (or the closest font you can find) from the Font field's drop-down menu. Highlight the character you want to insert in your document and click the Select button. (When you click a character, Windows will let you see an enlarged copy of the character.) When you have all the characters you want, click the Copy button or press CTRL-C. Back in your document window, click the Edit menu and choose the Paste command (or press the CTRL-V key combination) to insert the character.

Insert symbols. From time to time, you might want to insert a symbol, such as a heart or a diamond, in your document, rather than a letter. Character Map can help you. Select a symbol-based font, such as Symbol or Wingdings, from the Font field's drop-down menu. Follow the directions above for copying and inserting the symbol.

Skipping Character Map. Let's say you have a nonstandard character you commonly use in your documents. Opening Character Map each time could be a hassle you don't want. You can manually insert the character using Win95, Win98, or WinNT, though. (This feature works only with certain characters in Win2000.) When you highlight a nonstandard character in the Character Map window, you'll notice its keystroke equivalent is in the lower-right corner of the Character Map window, probably something such as ALT-0241. To manually insert this character in your document, place your cursor in the correct position. Then, hold down the ALT key and type **0241** on your numeric keypad. When you release the ALT key, the character will appear. Once you have the keystroke equivalent memorized, you'll undoubtedly find it faster to enter a nonstandard character using the ALT key. (This feature only works if the NUM LOCK key is toggled on.)

Games. The Games programs provide a diversion from your normal computing chores. Win 95 and Win 98 offer four games: FreeCell, Hearts, Minesweeper, and Solitaire. WinNT and Win2000 don't offer Hearts; instead they have Pinball.

In FreeCell, players attempt to move each of the 52 cards from the columns to the home cells. You must place each card in the home cell by suit and in order from lowest to highest. Windows' Hearts game mirrors the Hearts card game in which players attempt to score the fewest points by taking the fewest tricks containing point cards. In Minesweeper, players use clues on the game board to avoid randomly placed mines. The Solitaire card game in Windows mirrors the traditional Solitaire card game where players try to move all 52 cards onto the suit stacks. You must place each card on the suit stacks by suit in order from lowest to highest. In Pinball, players attempt to keep the pinball in play while hitting targets to score the most points.

The object of the FreeCell game in WinNT is to move all cards in order to the home cells in the upper right.

To open any of the individual games, click the Start button, Programs, Accessories, Games, and the name of the particular game you want to play. (*NOTE: If you're using a version of Windows in an office setting, and someone else, such as a system administrator, installed it, it's possible that some or all of the games weren't included in the installation to help you avoid the temptation of avoiding work. Darn those system administrators!*)

FreeCell's right-click option. In any version of Windows, right-click a partially hidden card to see its suit. This tip is especially helpful for discovering the suit of hidden aces.

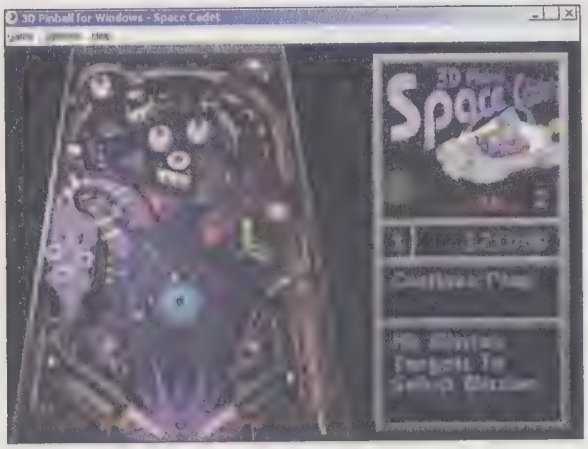
FreeCell's statistics. FreeCell will track your wins, losses, and winning percentage through the Statistics window. Click the Game menu, then the Statistics command. Unfortunately, FreeCell can't track statistics for more than one person on the same computer; the statistics reflect all FreeCell games played using your version of Windows on your computer. To reset the statistics to zero, click the Clear button in the Statistics window.

FreeCell's winning tips. Try to uncover aces and move them to home cells as soon as possible in the game; they'll give you additional outlets for moving cards. Keep as many free cells and columns open as possible while playing. Before moving your first card, look for trouble spots, such as both red fives buried at the top of a column, so you can work around them. You'll eventually need one of those fives, so try to move cards quickly off that column. Don't be afraid to create one extremely long sequential column on top of some unmatched cards; you'll be creating more usable working space in the other columns.

Hearts' silent side. Not that we'd ever accuse you of playing Hearts at work, but there are times when you don't want Hearts to give you audible warnings about game occurrences. In Win95 or Win98, click the Game menu. If the Sound command contains a check mark, Hearts' sounds are active. Click the Sound command to remove the check mark.

Hearts' winning tips. Leading with low spades early in the hand will increase the chances of forcing an opponent to play the queen of spades and will ensure that you don't win that trick. If possible, always eliminate the ace and king of spades from your hand, either by passing them or playing them as early in the hand as possible (as long as you have no chance of taking the queen). It's always best to pass high cards because you typically want to win as few tricks as possible. Keep an eye on an opponent who might be trying to win all the tricks containing hearts and the queen of spades, which is called Shooting the Moon; make sure at least two players have taken tricks with point cards before you start dumping hearts to prevent anyone from Shooting the Moon.

Minesweeper's winning tips. Number patterns yield the clues you need to find the



Win2000 offers Space Cadet 3D Pinball as part of its Games submenu.

mines. For example, 1-1-1 in adjacent squares at the bottom of a group of uncovered squares would indicate a mine under the middle square. Use Minesweeper's right-click options to mark mines, which will let you complete games much more quickly, especially on the more difficult levels.

Minesweeper's quick uncover option. Once you've marked all the mines around a particular square using the right mouse button, you can click both mouse buttons at the same time on the square to uncover all unmarked squares around the square. This is one of the few times in Windows where you'll simultaneously click both mouse buttons.

Pinball's map. If you aren't sure which targets you need to aim for in the WinNT and Win2000 Pinball game, click the Help menu and Help Topics. Click Pinball Overview and click the Enlarge Figure link. You can then see an explanation of the function of each area of the Pinball board.

Pinball's winning tips. Aim for the medal targets in the middle of the left side of the board; hitting all three of them three times in a row will help you earn an extra ball. The fuel targets in the upper-left corner of the board increase your fuel supply. If you are not sure where to aim next, Pinball gives you a clue by activating flashing blue arrows.

Solitaire's dirty secret. Cheaters never prosper...but they sometimes win at Windows Solitaire. We won't go into a diatribe about people who cheat at Solitaire. We will just tell you the secret and leave it at that. When you choose Options from the Game menu, you can choose to play Solitaire by drawing three cards at a time, three times through the deck or one card at a time, once through the deck. When drawing three cards, though, you can switch midstream to one card at a time by holding down the SHIFT-ALT-CTRL key combination while clicking the deck. This can be an advantageous method for finding a key card that you buried in a previous trip through the deck of cards... if you can live with yourself afterward for bending the rules, that is.

Solitaire's scoring options. You can play Solitaire using a variety of scoring options, including Standard and Vegas. In any version of Windows, click the Help menu and the Help Topics command to learn more about each scoring option. Click the Game menu and the Options command to open the Options window. Choose your scoring option in this window; click the None option to play Solitaire without scoring. If you play the Vegas scoring option, the game will keep a running score until you exit Solitaire. The next time you play Solitaire, the program will reset your score to zero.

Solitaire's winning tips. When you run into a dead-end with your Vegas or Standard scoring game, make sure you move all cards possible to the suit stacks; you score the majority of points by moving cards to these stacks. You don't have to move all the cards on a row stack to another row stack; you can choose to move only a portion of the stack or one card from the stack. This feature should help you uncover cards that you can move to the suit stacks.

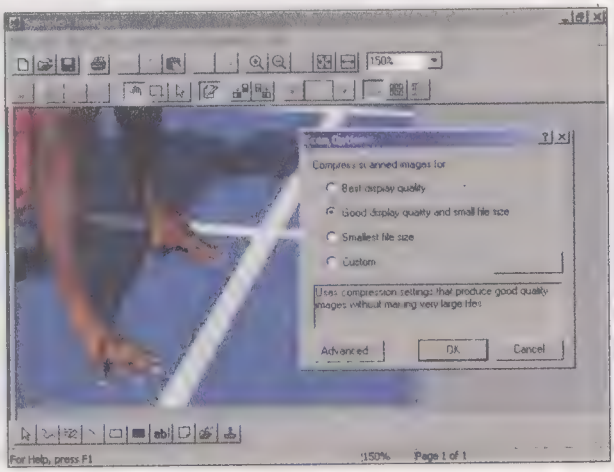
HyperTerminal.

The HyperTerminal program, which is outdated, lets you make a direct dial-up connection between your computer and a remote computer or BBS (bulletin board system). With the advent of the Internet and the World Wide Web, you'll rarely use HyperTerminal anymore, though.

To open HyperTerminal in Win98 or Win2000, click the Start button, select Programs, click Accessories, click Communications, and choose Hyper-Terminal. (In Win95, Hyper-Terminal is in the Accessories submenu. In WinNT, substitute the Hyperterminal submenu for the Communications submenu.)

Auto-detect can prevent errors. If you are having problems making a readable connection using HyperTerminal, try letting the application determine the correct settings. In any version of Windows, click the File menu and select the Properties command. Click the Settings tab and then select Auto Detect from the Emulation field's menu.

Sending and receiving. You can use HyperTerminal to send files to and receive files from a remote computer. Click the Transfer menu and then the Send File or Receive File command. However, you will need to know the protocols that the remote computer requires for file transfer.



Use the Scan Options window to set the quality and size of the scanned file in Win2000 Imaging.

Imaging.

The Imaging program gives users built-in scanning software for use with Windows. Imaging also lets you add items to an image, giving you a few more features than Paint does. Imaging is a good choice for several tasks, including scanning a document for faxing or preparing a photograph for faxing.

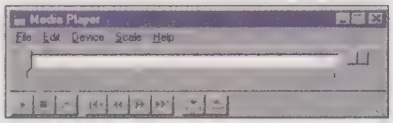
To open Imaging in Win98, Win2000, or WinNT, click the Start button, Programs, Accessories, and Imaging. (Win95 doesn't offer an Imaging command.)

Add captions. After you've scanned an image, you can add text information to any portion of the image, such as a caption. In

Win98, Win2000, or WinNT, click the Annotation menu and Attach-A-Note. Draw the note on the image and add your text.

Controlling scanned file size. Scanned images require various file sizes, depending on the quality of the image. Images scanned at Best quality will require significantly more storage space than those scanned at Good quality. You can control the quality setting. In WinNT, click the File menu and select Scan Preferences. In Win98 and Win2000, click the Tools menu and select the Scan Options command.

■ **Media Player.** The Media Player program gives users the ability to play and control several aspects of various multimedia files. You can also use Media Player to copy portions of a multimedia file for creating a new file or for pasting in another document.



The Media Player window in Win95 lets you play a variety of multimedia files.

To open Media Player in Win98, click the Start menu, Programs, Accessories, Entertainment, and Media Player. Substitute the Multimedia submenu for Entertainment in Win95 and WinNT. (*NOTE: Win2000 ships with Microsoft's update to Media Player, which is called Windows Media Player. You might have downloaded Windows Media Player from the Internet for use with Win98 or one of the other operating systems; if so, you'll probably see entries for both Media Player and Windows Media Player in the Entertainment or Multimedia submenu. We'll limit our discussions to Media Player.*)

Device menu differences. You will see the available file types that you can play under the Device menu in the Media Player window. The file types listed will vary from computer to computer, depending on the type of software you have installed elsewhere on your computer.

Finding Media Player controls. If you're playing a video clip in a full-screen window, you won't have immediate access to the Media Player controls to stop or pause the clip. To regain access to the controls, click anywhere on the screen.

Resizing video-clip windows. You can select the size of the window in which a video file will play on your computer. Depending on the speed of your computer and its hardware capabilities, it's probably best to play the files in a smaller window to achieve maximum performance. Once you have a video file loaded in Win95, Win98, or WinNT, click the Devices menu and Properties to select the window size.

■ **Notepad.** The Notepad program gives Windows users a clean, versatile format for creating text documents. Notepad is the preferred utility for editing critical system files, as well; although, fewer of these files need such editing in newer versions of Windows. Notepad doesn't contain any frills or complex features such as the ones you'll find in word processing software, but it is a handy tool. To open Notepad, click the Start button, select Programs, choose Accessories, and then click Notepad.

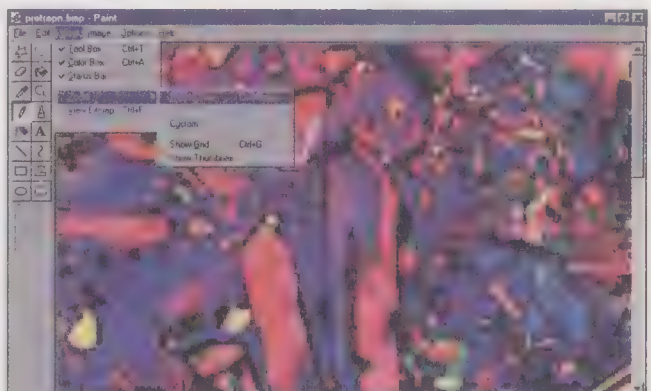
Create a log file. If you want to know whenever you start Windows, create a log file using the Notepad application. Each time you start the computer, the log file will record the date and the time. First, open Notepad and save a file with the .LOG file extension on the first line. (Type **.LOG.**) Save the file with any name you choose in your Windows START-UP folder. The file will open when you boot Windows, displaying a record of each time you started Windows. (*NOTE: To keep a running log of when you start up your computer, you must save it each time before you close it.*)

Make use of Word Wrap. The Notepad application has a strange feature that lets it display a paragraph of text as a single line that runs beyond the borders of the Notepad window, requiring you to use the scroll bar along the bottom of the window to view the entire paragraph. You can fix this problem by clicking the Edit menu in Win95, Win98, and WinNT followed by the Word Wrap command. (The command is in the Format menu in Win2000.) This command will cause Notepad to break each line once it reaches the border of the Notepad window.

Versatility. You can use Notepad to view and edit a wide variety of files, including INF (information) files and HTML (Hypertext Markup Language) files. Notepad is a better choice to edit such files because it doesn't add unseen formatting characters as do most word processing programs. To open either type of file, click the File menu and then select the Open command. Click All Files from the Files Of Type field's drop-down menu. Find the file on your hard drive and click the Open button.

■ **Paint.** The Paint program offers an easy-to-use format for making minor editing changes to image files, such as bit-mapped files. When you press your keyboard's PRINT SCREEN key, you're saving a copy of the present, active window (called a screen shot) in the Windows Clipboard. You can open Paint (click the Start menu, Programs, Accessories, and then Paint), click the Edit menu, and select the Paste command (or press CTRL-V) to view a copy of your screen shot.

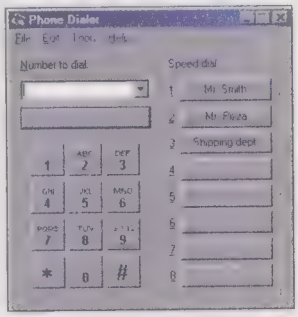
Create wallpaper. You can create your own masterpiece and show it off on your Desktop using Paint. You can use any image edited or created in Paint as your Desktop wallpaper. In any Windows version, click the File menu and select the Set As Wallpaper command. You can choose to tile or center the image.



In Paint, you can see a detailed or normal view of the image you are viewing. Above, you see a detailed view.

Zoom in. For detailed work in Paint, magnify the image in which you're working. Click the View menu and Zoom. Click Custom and select magnification up to eight times normal.

■ **Phone Dialer.** The Phone Dialer program lets you make Windows dial phone numbers it has stored for you. Phone Dialer can record a log of all incoming and outgoing calls, too. Phone Dialer has undergone a major upgrade in Win2000, giving you the ability to make regular voice calls, as well as set up conference video calls.



Through WinNT's Phone Dialer, you can create up to eight speed-dial entries.

To open Phone Dialer in Win98 and Win2000, click the Start button, select Programs, click Accessories, click Communications, and select Phone Dialer. In Win95 or WinNT, Phone Dialer is in the Accessories submenu.

Limiting the log. By clicking the Tools menu and Show Log in Win95 or Win98, you can see all the incoming and outgoing calls made through Phone Dialer. You can limit the log to display only one type of call, though. From the Call Log window, click the Log menu and Options. Select whether you want to track incoming or outgoing calls by removing the check mark from the other type of call and clicking the OK button. In Win2000, you can open the log window by clicking the View menu and choosing the Call Log command. However, you can't limit the log to one type of call. (Tracking Phone Dialer's calls through a log isn't an option in WinNT.)

Using speed dial. Phone Dialer in Win95, Win98, and WinNT lets you save up to eight telephone numbers in its speed-dial memory. To save a number to speed dial, click an empty speed-dial button, type the name and phone number, and click Save. To make a speed-dial call, click the desired speed-dial button in the Phone Dialer window. You can edit the information in a speed-dial button by clicking the Edit menu and choosing Speed Dial.

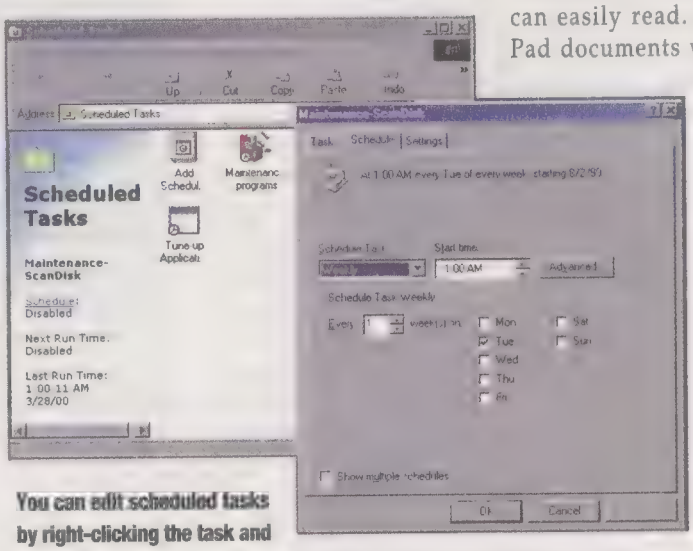
In Win2000, you can create dozens of speed-dial entries. Click the Phone menu, select Speed Dial, and then click Speed Dial List. Click the Add button. Enter the name and number in the appropriate boxes and click OK. To dial a number saved in your speed-dial list, click the Phone menu, choose Speed Dial, and select the name you want to dial.

■ **Scheduled Tasks.** The Scheduled Tasks program gives you the opportunity to see and edit tasks, such as a virus scan or a defragmentation of the hard drive, that you have scheduled Windows to automatically run. You can set up almost any program to automatically run through the Scheduled Tasks program. To open Scheduled Tasks in Win98 or Win2000, click Start, Programs, Accessories, System Tools, and Scheduled Tasks. (*NOTE: Win95 and WinNT don't offer Scheduled Tasks.*)

Editing tasks. To open a task that appears in the Scheduled Tasks window, double-click its icon. In the task's window, change its schedule by clicking the Schedule tab or determine exactly under which conditions it should run by clicking the Settings tab.

Running tasks early. If you want to perform a task before its scheduled time, right-click the task's icon in the Scheduled Tasks window and select the Run command from the pop-up menu.

Stopping Task Scheduler. There may be times when you don't want Task Scheduler to run, such as when you are downloading a large file or performing a tricky software installation. Click the Advanced menu in the Scheduled Tasks window. Choose the Pause Task Scheduler command if you want the tasks to resume when you remove the pause setting by clicking the Continue Task Scheduler command under the Advanced menu.



You can edit scheduled tasks by right-clicking the task and selecting the Properties command. In the dialog box that opens, edit the options on the Settings and Schedule tabs.

Make a makeshift calendar. You can use Scheduled Tasks to open a file at a scheduled time rather than run a program, making it behave similar to a calendar or reminders program. For example, you may want to make some notes to yourself in a word processing file about a meeting Tuesday at 10 a.m. You could then make Scheduled Tasks open the file at 9:30 a.m. on Tuesday to give you a reminder. Double-click Add Scheduled Task and click Next. Then click the Browse button, find the file on your hard drive, and click Open. Follow the subsequent steps in the Scheduled Tasks Wizard to make the file open at the desired time.

■ **WordPad.** The WordPad program gives Windows users a basic word processing program that contains a few more features than Notepad. WordPad will work well for users who don't have access to other, feature-rich word processors or for users who don't want a bevy of potentially confusing features. To open WordPad, click the Start button, Programs, Accessories, and then WordPad.

Note taking. Because you can easily resize WordPad's working window to any dimension, it's an ideal application for taking notes while working on the Internet or in another application. Size the WordPad window and the other application's window so both are visible. In any version of Windows, click the View menu and Options. Click the Wrap To Window radio button and click the OK button.

Use RTF. Rich Text Format (with an .RTF extension) is a file format that WordPad can easily read. You can share WordPad documents with almost any other word processing program by saving your file in RTF. Click the File menu and Save As. In the Save As Type field's drop-down menu, select Rich Text Format (RTF). Using files created by Microsoft Word (with the .DOC file extension) with WordPad typically works well, too. LS

by Kyle Schurman

CHILDREN: don't talk to strangers.

PARENTS: don't become strangers.

Windows File Management

Organizing Your Files & Folders Into A Logical Sequence

Key Points

- Computer systems quickly fill up with data; that's why effective organization is critical.
- Creating a logical sequence of folders and subfolders is one of the best ways to manage data.
- Knowing how Windows Explorer works is essential to organizing data.

Computers sold today commonly have hard drives with a capacity of eight, 10, and even 20GB (gigabytes), which is up to approximately 20 billion bytes. When you consider that a simple word processing document might occupy about 20KB (kilobytes) of space, or approximately 20 thousand bytes, you can see how a 10GB hard drive could hold thousands upon thousands of files. Even if you only fill your hard drive to a tenth of its capacity with files, that's still a lot of information to store.

Therefore, it's important to keep that data as well organized as possible. Creating logical folders, archiving little-used files, and generating shortcuts are just some of the ways to use Windows to maintain files and folders. Whether you're starting from scratch or using an existing system, the time to organize your data is now.

Get To Know Windows Explorer.

Before tackling the organization process, it's a good idea to take a few moments to get to know your system and all the files it contains. Windows Explorer is the index of your entire Windows system, with a tree structure that lays out exactly how your system's files and folders are grouped. The folder hierarchy is displayed on the left, the contents of the currently highlighted folder are displayed on the right, and in some cases a preview pane appears in the middle.

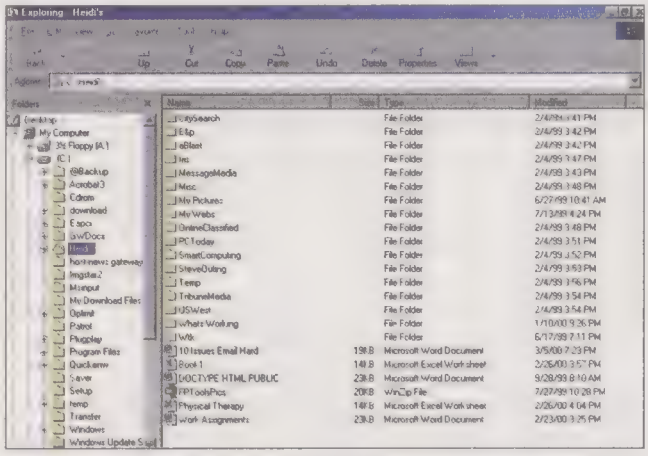
Open Windows Explorer by selecting Programs, then Windows Explorer from the Start menu. Or, right-click the Start button and click Explore from the pop-up menu. To see the highest level view possible—that is, to see only the main components of your system—look in the left frame at the small squares to the left of each component. Each square will have either a plus (+) or a minus (-) sign; click each one so that it contains a plus sign. Under the Desktop, you'll probably see components such as My Computer, My Documents, Internet Explorer, and the Recycle Bin. To see the branches of these components, click the box so a minus sign appears, or click once to highlight an item and watch as its contents appear in the frame on the right.

On the right side, you can view a wide range of information about a selected group of files and/or folders, including name, size, type, and when the file or folder was last modified. You can arrange these columns according to your needs. For instance, if you want to see the files or folders sorted by date, click the Modified column to sort by most recent or the oldest file. Or, click Name to see an alphabetical list.

With some versions of Windows such as Windows 98, if you have opted to view

Windows Explorer as a Web page (by choosing View, As Web Page), you'll be able to preview some file types in a middle section. To see how this works, try highlighting a graphics file on your system by clicking it once; and depending on the file, you may see a thumbnail sketch in the center section. You can also preview some file types by right-clicking the file and choosing Quick View from the pop-up menu.

Now, take a moment to explore the various customizations of Windows Explorer. If you prefer icons to a list of files, go to the View menu and select Large Icons or Small Icons instead of List or Details. In the same menu, you can also choose to arrange icons by Type, Size, or Date rather than the default value of Name. Or, place the pointer on the bar between the two panels, wait until it changes into a two-headed arrow, and drag and resize the windows.



Windows Explorer is the index of your entire Windows system, with a tree structure that displays everything according to how your system's files and folders are grouped.

Creating Files & Folders.

Now that you've taken a look at Windows Explorer, imagine what it would look like if none of the files were placed into folders and if the files all had names such as Gjrildci.exe and Sudifnelscsdinsdaflas.doc. Not only would the list of files scroll off your computer screen and out the door, but even if you could find a particular group of files, you'd have to look inside each one to find out what it contains because such names are meaningless.

One smart way to organize your files is to create a separate folder for all of your documents and a separate folder for each user of your system. This has the obvious advantage of making files easier to find, but it also makes it easier to back up your work, and it eliminates some of the risk of deleting files you may not need (but another user does). Windows has created a useful folder for you automatically; just look on your Desktop for a shortcut folder called MY DOCUMENTS. You can rename this folder by right-clicking the folder, choosing Rename, and typing in the new name. For example, you might want to call it JOE'S FILES (assuming your name is Joe).

To add folders for other computer users, open Windows Explorer, navigate through the directory on the left to locate where you want to place the folder, and select New, Folder from the File menu. You can also create folders within folders in this same manner. Open your MY DOCUMENTS folder and create new folders called, for instance, WORK, LETTERS, and PERSONAL FINANCE. Create as many folders as you need because folders don't use much hard drive space; think of them as virtual place holders.

Within these folders, give some thought as to how to appropriately name files. This might seem obvious—you wouldn't want to file a sales proposal as Vacationplan.doc—but there are some small tricks to naming files. Although Windows lets you use long file names, consider keeping them as short as possible so that if you send them to persons using other operating systems, a shortened name makes sense to the recipient.

In addition, don't save two files as ProposalForClientA.doc and Projected ExpensesForClientA.xls when it's more logical to create a folder called CLIENTA and name the documents Proposal.doc and Expenses.xls. And, when you're downloading files off the Internet, you aren't required to use the default name; feel free to rename the file whatever works best for you.

(*NOTE: For the following sections, we describe how to manipulate files when Windows Explorer is viewed in the classic Desktop style, not as a Web page. To follow our directions, make sure that your Windows Explorer does not have As Web Page selected in the View menu.*)

Moving & Archiving Files.

Once you've set up an organized system of file folders, you're ready to move files around so they are accessible from the most logical places. The first thing to keep in mind is that although it's fine to move around documents and other discrete files (word processing files, graphics files, etc.), it's best not to touch an application file that has already been installed. That's because applications have many pieces, and when you start moving them around, the rest of your system might become "confused," and the application may no longer work.

Still, there are plenty of files you probably need to move to get organized. After moving files so they are in logical groupings, you should archive little-used files. That way, you'll be able to access them in the future without having to scroll through their listings during day-to-day operations. When archiving files, it makes sense to place older documents in their own folders. In addition, if you're placing files onto a separate **medium** (a singular term for computer storage material such as a diskette, CD, and tape) to free up drive space, keep in mind that graphics and other multimedia files take up more space than text files, so consider moving those files first.

One of the simplest ways to move a single file or folder is to open Windows Explorer, highlight the file you wish to move (in the right frame), then press the mouse button down and drag the file where you want it (into a folder in the left frame) and release the mouse. To move a group of files that are located next to one another, place the pointer on the first file, hold down the SHIFT key on your keyboard, and use the Down arrow key to highlight numerous files, and then drag the whole group of files to a new location. You can also move multiple files that aren't listed next to one another by placing the pointer over one of the files, holding down the CTRL key, selecting individual files with your mouse, and dragging that group to a new location.

Copying Files.

The previously mentioned drag-and-drop procedures work fine when moving files around a hard drive, but if you're dragging and dropping files to a different drive or diskette, Windows will copy the files rather than moving them. You can override these default values, though. Just hold down the SHIFT key to move it instead. Likewise, if you wish to copy a file to another location on the same drive, hold down the CTRL key when moving a file to copy it instead of merely moving it.

Copying files is a useful management tool. One crucial reason for copying files to new locations is to protect your data in case of a system failure. Regular backups can turn a potential disaster into a minor inconvenience, and the value of complete system backups can't be emphasized enough. It may not always be possible to back up your entire system, but you can ease the pain of a system crash by backing up selected files, including all the data files you have created that don't exist elsewhere.

The process of copying these files onto backup media will depend upon the type of medium used. If you're using an online backup system, such as @Backup (http://www.atbackup.com), you'll need to follow its instructions for selecting files. If you're backing up files onto tape, a diskette, or portable disk drive, such as the Iomega Zip, you can drag and drop files via Windows Explorer. You can also take advantage of the built-in Microsoft Backup system. For more information about backing up files, see "Reinstallation Rundown" in this issue.

Copying files onto diskettes is one of the easiest and most straightforward ways to backup data, but the process also has some notable limitations. Diskettes only hold 1.44 megabytes (MB) of data, and it's a good bet that you'll have single files that are too large to be copied onto a single diskette. That's where splitting utilities come in handy. File splitting utilities do just what the name implies—split a file into smaller files that can be moved or copied in pieces and then later reassembled into the original file. Some of these utilities are AxMan (http://www.mosaicware.com/axman.html), File Splitter Deluxe (http://www.softdd.com/filesplt/index.htm), and Part It (http://www.skylark utilities.com/part-it.pcs).

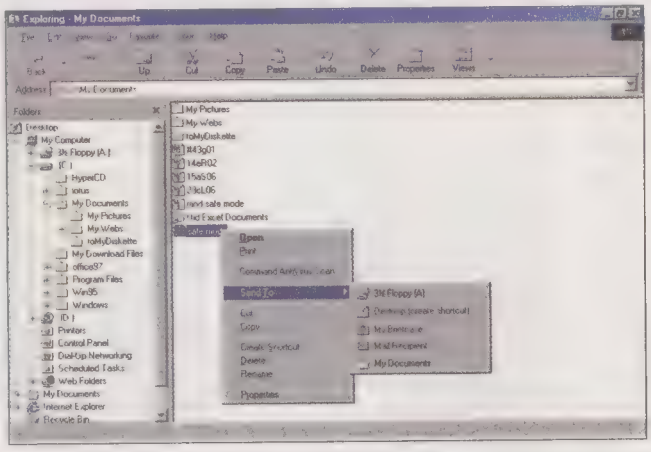
Dragging and dropping files in Windows Explorer isn't the only way to copy files. You can also copy files from within applications by saving them to two or more locations. For example, when saving a Microsoft Word document, after you've saved it in one location, use the Save As option in the File menu to save the file to another location. While doing so, however, be careful to keep track of which file contains the latest version so you don't replace a new version with an older one.

Compression. Now that you have the structure of your file system in order, we'll take a look at some other tools and techniques for organizing and managing your data, starting with compression.

Compression lets you turn larger files into smaller ones without compromising the integrity of the data. This is useful for files you need to save but seldom need to access. Compression programs do such things as removing extra spaces and substituting smaller bits of data in place of larger strings. Then, when the file is decompressed, the processes are reversed. You're probably aware of third-party software programs such as WinZip, but you may not be familiar with a Windows utility called DriveSpace.

DriveSpace 3 (DriveSpace 2 was included with Windows 95) can compress both diskettes and hard drives, greatly increasing your file storage space, and Windows makes it easy to walk through the process. Be aware, however, that if your hard drive has been converted to FAT32 (32-bit version of the file allocation table), you cannot use DriveSpace. To try out DriveSpace, go to the Start menu, and select Programs, Accessories, System Tools, and DriveSpace.

On the other side, decompression is necessary when trying to view some files. Suppose you receive (via e-mail, diskette, or some other method) a compressed file in the form of File.zip. This "zipped" file could be one file or it could be a group of files compressed into one file, so the best approach is to create a temporary folder in which to store the File.zip file. That way, when you decompress the file, you'll be able to see at a glance all the files it contains.



You can copy files by dragging and dropping them, or you can just right-click a file and use other options from the pop-up menu.

Searching For Files. Another aspect to managing data is being able to quickly put your fingers on a particular file. If you know the name of the file but can't remember where you stored it, let Windows Explorer help you out. Just open Windows Explorer and select Find from the Tools menu. Next, select Files Or Folders and type the name of the file in the Named field under the Name & Location tab. Then, make sure the Look In field lists a location that is as broad as possible.

For instance, if you know the file is somewhere on the C: drive, and you think it might be in a folder called WORK but you're not quite sure, use the pull-down menu next to Look In to select C: rather than C: WORK. Also, be sure the Include Subfolders checkbox is checked.

When searching for files, you don't need to know the exact name of the file. If you're unsure of any of the characters in either the file name or its extension, use the asterisk key to replace that string or strings. For example, when looking for a file that might be named Worksched.xls or Work schedule.doc, typing **Work*.*** in the Named field will search for both of these files.

Shortcuts. For files or programs that you access frequently, don't overlook two useful file management tools: shortcuts and the Start menu.

A shortcut is an icon, usually placed on your Desktop, that lets you easily access a file or folder anywhere on your system without altering its real location. To create a shortcut, open Windows Explorer, highlight the desired file or folder, right-click it, and select Create Shortcut from the pop-up menu. Windows will then add the new icon (or list item) to the existing location, and you can drag and drop the new icon onto the Desktop or into another folder. If Windows Explorer takes up the entire screen so you can't see your Desktop, make the Explorer window smaller and then drag the icon onto the Desktop.

You can also add an item to the Start menu using the drag and drop method. This is particularly handy for programs that are buried within the Programs menu. After creating a shortcut on the Desktop, drag the icon and drop it on top of the Start button, and a shortcut will appear on the upper portion of the first Start menu section.

■ **Clean Up Data.** Sooner or later, no matter how well-organized your system is, you'll need to clean up your hard drive by deleting unwanted files and folders, defragmenting your hard drive, and using some type of synchronization to ensure that your system isn't bogged down with duplicate, identical files.

You might think that when you save a file or use an application that the data is stored in one physical location on your hard drive, but it doesn't necessarily work this way. Instead, pieces (or fragments) of data are stored in separate places, and when the file is opened, the fragments are combined again. But over time, as more and more fragments are stored, the operating system has to spend an increasing amount of time looking for them. Win98 has what is called a Disk Defragmenter, which rearranges these pieces so the hard drive operates more quickly and space is used more efficiently.

To run the Disk Defragmenter, go to the Start menu and select Programs, Accessories, System Tools, and then Disk Defragmenter. You will be prompted to select a drive, and then follow the on-screen instructions. For best results, run the Disk Defragmenter when other applications are closed. Although Disk Defragmenter will let you use your computer for other tasks while it is running, both the computer and the utility will run noticeably slower.

Another useful utility for cleaning up your system is one you might already be familiar with: the Add/Remove Programs tool in the Control Panel. When programs are installed, they place numerous pieces in various spots on your hard drive, so you shouldn't try to remove a program manually by simply deleting the files and folders you can see because you're almost guaranteed to miss some.

Instead, look within the application's program directory (by going to the Start menu, selecting Programs, and finding the folder of the unwanted application) for an uninstall program of its own (and follow its instructions). Or, open the Control Panel (via Start, Settings), double-click the Add/Remove Programs icon, highlight the unwanted application, and then click the Add/Remove button.

Synchronizing utilities can also help eliminate unwanted files. These utilities are designed to identify identical files and rid your system of duplicates. For instance, you're likely to have multiple Readme.txt files on your system, one for each application, and you can use a synchronization program to make sure these files are all distinct. Some of these useful utilities include ToolKit98 (http://members.xoom.com/_XMCM/sidb/software.htm) and File SyncForce (http://www.objectforce.com).

Finally, one of the best and easiest ways to clean up your system is to take out the trash. When you delete a file or folder from within an application or from Windows Explorer, you're merely placing it in the Recycle Bin. The file stays on your hard drive until the Recycle Bin has been emptied. When you're certain you no longer need a file, put it in the Recycle Bin, right-click the bin icon on your Desktop, and select Empty Recycle Bin. LS

by Heidi V. Anderson

10 Ways To Improve Organization In 10 Minutes

1. Use the Send To option. To quickly send files or folders to another destination (which is especially useful for transferring them to a diskette), you can skip the drag-and-drop process and use the Send To command. In Windows Explorer, highlight the designated file or files, right-click them, select Send To from the pop-up menu, and indicate the final destination.

2. View files by date. Can't remember the name of the file you recently downloaded? Go into Windows Explorer and click a directory's Modified column to see a list of files in order from the most recent to the oldest.

3. Download smarts. When downloading a file from the Internet, don't feel obligated to place it in the default directory. Consider placing it in a more appropriate folder, such as one you've created that groups files according to content.

4. Archive old files. If you have a number of files on your system that you access only sporadically, store them on a separate medium (such as a diskette or CD) so they don't take up space on your hard drive.

5. Use dates in names. If you use dates as the start of file names, use digits rather than letters (such as 03 rather than March), so that alphabetizing files also puts them in order according to date.

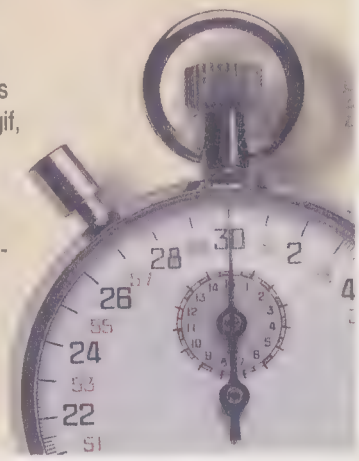
6. Simplify with short names. Windows lets you use long file names, but for searching and sorting purposes, it's best to use names that are as short as possible.

7. Search more efficiently. When searching for a file, use the asterisk (*) when you aren't sure of a file type. Searching for Filename.* will display all possible matches, such as Filename.doc, Filename.gif, and so on.

8. Folders, folders, folders. Folders take up negligible space on a hard drive, so create as many folders and subfolders as possible. Separate folders into whatever logical system makes it easier to locate files.

9. Preview a file. Are you browsing through a directory looking for a certain graphic? Rather than opening up a graphics viewer and fully opening each file, save some time by opening Windows Explorer and choosing As Web Page from the View menu. By doing so, a preview pane will give you thumbnail sketches of some files.

10. Rid the Desktop of unnecessary shortcuts. If you have cluttered your Desktop with shortcuts to files and folders, just drag the unused ones to the Recycle Bin. Don't worry; you aren't deleting the file, just the link to it. □



Files You Need To Know

The Essentials For Running Legacy Programs

Every operating system comes with several files that are essential for its operation. The Registry obviously is the most important Windows 98 file; so important, in fact, that several articles in this issue are devoted to it and its associated editing tools. But several other files lurking under the surface are important for working with legacy 16-bit software. Every version of Windows since Windows 95 has been marketed as a 32-bit operating system, but that's a half-truth. While they contain mostly 32-bit code, they are built on a 16-bit foundation to ensure compatibility with Windows 3.x and the MS-DOS (Microsoft Disk Operating System).

You can access many of the files we discuss in this article through the System Configuration Editor. This file is found in the C:\WINDOWS\SYSTEM folder (it's named Sysedit .exe, so you know where to look when we refer to it. We also will point you to the System Configuration Utility so you can edit some legacy files. It's part of the Microsoft System Information program that you access by clicking Start; expanding Programs, Accessories, then System Tools; and finally clicking System Information. Choose System Configuration Utility from the Tools menu to launch the editing software.

Some of the files we will discuss are hidden unless you've enabled the appropriate settings. To access the settings, click Start, expand Settings, click Folder Options, and choose the View tab. Click the Show All Files radio button under Hidden Files and uncheck the Hide File Extensions For Known File Types box. Click Apply to cement the changes.

Key Points

- Although Win9x is marketed as a 32-bit operating system, there is still a lot of 16-bit code under the hood. Knowing how to manipulate 16-bit files can be important, especially if you plan to use DOS or Windows 3.x software.
- Win9x can be forced to operate like Win3.x if you know where to look.
- Win9x comes with several tools that make finding and editing legacy DOS and Win3.x files a breeze. Don't miss the System Configuration Utility if your DOS skills are rusty.

■ **Legacy Windows 3.x Files.** To provide backward-compatibility with 16-bit Win3.x software, Microsoft had to leave some of the key system files from older operating systems in the Win98 code. The older software requires files, such as System.ini and Win.ini, because the software looks to them to retrieve settings and other preferences.

System.ini. Win3.x didn't have the Registry that all 32-bit versions of Windows rely on. Instead, all system settings were stored in .INI (initialization) files, and System.ini contained all the information Win3.x needed to interact with hardware installed on the system. Win98 retains this file because older programs designed for Win3.x won't run without it.

It is unlikely you'll ever need to edit this file, and any mistakes you make while doing so can be time-consuming to fix. Always back up files before tampering with them. If you do need to modify System.ini, double-click it and it will open in Notepad. You can also access it from the System Configuration Editor. Be aware that every time Windows boots, the legacy .INI files use information stored in the Registry, which negates most of the changes you can make to this file.

Win.ini. The other legacy .INI file Win98 uses is Win.ini. There are a few hardware settings in here, but Windows preferences and other software settings constitute the bulk of this file. The 16-bit software will look here to check you printer configuration.

Our advice for editing this file is the same as the System.ini file: don't. Windows will just bypass most of your changes the next time it is booted. For best results, change the settings in the actual programs and hardware devices listed in the Win.ini file because those changes will be reflected in the Registry, and thus, the Win.ini file. That said, you can open it using any of the methods listed for the System.ini file.

■ **Legacy DOS Files.** Win98's backwards-compatibility doesn't stop at Win3.x; it reaches all the way back to MS-DOS. These files are tricky to configure. If you ever have the need to run older DOS applications, it pays to know what each file does and the methods to access them for editing.

Autoexec.bat. The .BAT in Autoexec.bat indicates it is a batch file, which just means it contains several initialization commands instead of one. The Autoexec name is short for automatically executing, meaning all of the commands in the file are launched with no user intervention. Autoexec.bat is the first program DOS looks to during the boot process because it contains most of the initialization

settings for important hardware drivers, such as the mouse and CD-ROM drive.

This was before the days of Plug and Play, when users had to type initialization strings manually and endlessly tweak them. Autoexec.bat was indispensable as far as DOS was concerned, but Win98 doesn't need it to operate. It remains solely for compatibility's sake, so you may want to disable it if you never use DOS. If you upgraded to Windows 9x (Win95/98) from an earlier version of Windows (or DOS), your old Autoexec.bat file is backed up under the name Autoexec.dos. You can rename this file Autoexec.bat (after backing up the existing Autoexec.bat file) to restore it.

To view the contents of the Autoexec.bat file and to edit it, right-click the file's icon and click Edit. This opens the file in a standard Notebook window. To disable a line without deleting it, type **rem** in front of the line, leaving a space between the word rem and the line. That way you can engage the string again if you decide you need it by simply deleting rem. Autoexec.bat also is accessible in the System Configuration Editor.

An alternative to all this is to open the System Configuration Utility and click the Autoexec.bat tab. Here you see the same contents that would appear in the Notebook editor, but with check boxes in front of the strings. To disable a line, uncheck its box. To edit a line, double-click it and type a new entry. To add a line, click any white portion of the box and click New.

Config.sys. Another major initialization file all DOS users are familiar with is Config.sys. This file contains most of the device initialization strings and memory settings DOS uses.

It is possible to open Config.sys in Notepad by double-clicking it. Use the rem statement as described above in Autoexec.bat to disable lines. You also can click the Config.sys tab in the System Configuration Utility and follow the steps outlined in the Autoexec.bat section to view and modify the file.

Real-mode (DOS) mouse drivers can interfere with Windows' operation, and that is why they already are disabled when you first access Config.sys. Keep them that way to avoid trouble. Also look for mouse initialization strings in the Autoexec.bat file and suppress them.

If you occasionally use DOS programs, you should create a DOS boot diskette containing all the Startup files that DOS requires for operation. Open My Computer, right-click the 3.5-inch Floppy (A:) icon, and click Format. Put a formatted diskette in the drive, choose the Copy System Files Only radio button, and click Start. This will copy all essential DOS system files to the diskette. If the diskette in the drive is not formatted, choose the Full radio button and check the Copy System Files box in Other Options.

Next, copy Autoexec.bat and Config.sys to the diskette. Now you can edit any of the files on the diskette without disturbing their Windows equivalents. When you need to use DOS, insert the DOS boot diskette before powering up the system, and it will bypass Windows and go straight into DOS mode using the settings you established.

Command.com. Command.com is DOS' command processor. As the name implies, Command.com was the upper-end of DOS' file hierarchy. Subordinate files, such as Autoexec.bat and Config.sys, reported their settings to Command.com, which was used to execute those commands. You'll need it if you want to run DOS files, otherwise ignore it. Nonprofessionals don't usually edit this type of file.

EMM386.exe. One of the main limitations of DOS was its inability to address more than 1MB (megabyte) of RAM (random-access memory) without using a separate memory manager. This is where EMM386.exe came in. When added to the Config.sys file, EMM386.exe could fool DOS into addressing much more than a measly megabyte of RAM. If you ever need to access the EMM386.exe file, it's in C:\WINDOWS.

■ **Miscellaneous Files.** Some of the files hidden in Win98 aren't essential for backwards-compatibility, but they certainly are nice. The following files didn't fit neatly into the other two categories, but we're sure you'd like to know about them.

A reminder of the good old days. This is your File Manager, complete with short file names.

It is easy to access most legacy DOS files, such as Autoexec.bat, from the System Configuration Editor.

Winfile.exe. We know you're out there. You holdouts who pine for the simplicity and efficiency of Win3.x's File Manager. Well, you can have it by launching Winfile.exe from the C:\WINDOWS directory. It replaces the Win98 Desktop with that familiar old File Manager, which works just like it used to. At least it looks like it replaces the Desktop; you can move it around and resize it just as you would a normal window. If you plan to use File Manager all of the time, put a shortcut to Winfile.exe in the C:\WINDOWS\START MENU folder to force the program to launch each time Windows boots.

C:\WINDOWS\COMMAND FOLDER. OK, this isn't a file, but the C:\WINDOWS\COMMAND folder is full of all of the extra files DOS users love. This is where you'll find the infamous Mscdex.exe CD-ROM driver file that is absolutely essential if you want to use your CD-ROM drive in DOS. Hard drive tools, such as Fdisk.exe and Xcopy.exe, are also in here, along with oft-used files such as Edit.com and Deltree.exe. If you come across a DOS tip that calls for a certain file, chances are you'll find it in this folder. LS

by Tracy Baker

Windows File Systems

What You Need To Know About FAT16, FAT32 & NTFS

Three file systems currently populate the various Microsoft Windows operating systems: FAT16 (file allocation table), FAT32, and NTFS. FAT16 is the oldest and most widely compatible. FAT32 is a more efficient system released with a later version of Windows 95. NTFS was developed to offer efficiency and security to Windows NT users, but it is now also the default for Windows 2000.

Windows users could safely ignore their computer's file systems except for one critical issue: hard drive space. Those still running a version using FAT16 have room to gain by converting to FAT32. In a Knowledge Base article, Microsoft calls converting from FAT16 to FAT32 "one of the biggest performance enhancements you can make to your Windows 98-based computer."

Think of it as turning your computer's FAT into hard drive muscle. "You certainly gain a lot of additional storage space," said Jim Boyce, author or co-author of 40 books on computer issues. While Microsoft estimates a 10%-15% gain in free space, others, including Boyce, hike that estimate to 25% or more.

Key Points

- FAT16 is the oldest, most compatible, and least efficient file system.
- FAT32 is more efficient and is compatible with Windows 95 OSR2 and higher.
- NTFS is the most efficient and secure file system. It was created for Windows NT but is now available in Windows 2000.

Windows NT and Windows 2000 users are less likely to switch from the default file system, NTFS, to FAT16 or FAT32. But there are exceptions. For example, users who dual boot a version of Windows earlier than WinNT or Win2000 need to use FAT16 in order for both operating systems to access the same data.

To decide whether you want to take the time to change file systems, you first need to understand what your file system does for your computer.

■ **File Systems.** FAT is one of five areas (master boot record, partition table, boot record, root directory) that your hard drive uses for organization. If you think of your computer as a library of data, the file system is like the card catalog. The file allocation table keeps track of the location, content, and status of files and folders saved to your hard drive.

The file allocation table locates files and folders in various clusters, the spaces reserved on your hard drive for files. A cluster is the smallest amount of hard drive space an operating system will allocate to saving data. Clusters are made up of sectors, which are the smallest unit of storage.

When you are working in a software application and request a file, the file allocation table finds it. It sounds easy, but in reality, files—specifically larger files—are saved among many clusters. The file allocation table keeps tracks of how many clusters are needed to construct a file and in what order they should be put together.

As a file system, NTFS is the same in theory, but different operationally, than the traditional FAT. It still uses clusters made up of sectors to store data. But it uses an MFT (master file table) and offers functionality not available with FAT16 or FAT32.

■ **FAT16.** FAT16 is often shortened to FAT, because it's the original file allocation table. Developed in 1977 by Microsoft to organize data on diskettes, this 16-bit file system was standard for DOS and Windows and is compatible with Linux, OS/2, Windows NT, and others. Because it is the most compliant across the different operating systems, FAT16 was the gold standard for years.

FAT16 may have remained popular if not for its inability to handle larger hard drives. This wasn't an issue in the late 1970s, but as the 1980s brought leaps-and-bounds growth of hard drive size, this major limitation had to be addressed. Today, the maximum hard drive size FAT16 will work with is 2GB (gigabytes), which is tiny compared to what many computers ship with today.

■ **FAT32.** Microsoft formulated a solution to FAT's hard drive size limitation and released a 32-bit FAT with Windows 95 OEM Service Release 2. The major difference was a much smaller cluster size than FAT16, allowing FAT32 to use space more efficiently. In addition, the new version reduced the danger of a single point of failure, due to its ability to utilize a backup copy of FAT32.

FAT32's smaller cluster size can support hard drives of up to 2TB (terabytes, a terabyte

is 1 trillion bytes), a size that once seemed unimaginable. FAT32 also offers an unlimited root directory, while FAT16 limits its root directories to 512 files and folders. FAT32 also allows the root directory to be moved, whereas FAT16 requires the root directory to be at the beginning of the hard drive, creating a critical failure if that section of the hard drive becomes damaged.

NTFS. NTFS was engineered not only for efficiency, but also for reliability and security. For this reason, it's considered best for high-end systems and servers. Originally designed for use on WinNT systems, this file system is now also the default for Win2000.

In NTFS, the cluster size has again decreased, allowing more efficient use of hard drive space. There are, however, other major differences between NTFS and FAT16 and 32. For example, NTFS users sharing files through a network can be assigned very specific permission levels. Each file allows different levels of access to users: read only, read/write, or deleting.

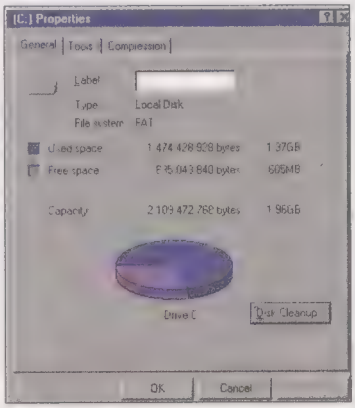
Unlike FAT32, NTFS prevents security breaches on local computers by letting you protect individual files as well as directories. FAT32 supported only share permissions, which protect a file over a network but don't prevent someone from sitting at your computer terminal and accessing it.

NTFS also offers improved fault tolerance. It repairs hard drive errors seamlessly by comparing files to copies saved on the hard drive. If a copy doesn't match, NTFS avoids that hard drive section and rewrites the copy to another part of the drive.

Take Up the Slack. The major difference between the three file systems, other than increased functionality of NTFS, is how efficiently they use space. Cluster size for each file system can change with hard drive size, but the relative cluster sizes remain constant: FAT's clusters are the largest, FAT32's are smaller, and NTFS' clusters are smaller yet. For example, in a computer with a hard drive just over 1GB, the following values would apply:

FAT16: 32KB clusters
FAT32: 4KB clusters
NTFS: 1-2KB clusters

A 2KB (kilobyte) file would require one cluster of 32KB in FAT16, wasting nearly 30KB of space. That same file would take up one 4KB cluster in FAT32, wasting just 2KB of space. In NTFS, that 2KB file would take just one or two clusters and waste virtually no space. That unused part of a cluster is called "slack." Taking up the slack is one benefit of converting from FAT16 to FAT32 or, where possible, NTFS.



This shows a Win98 system before conversion to FAT32.

Find Your FAT. To find out what file system you have, double-click My Computer, right-click the drive, usually C:, and then click Properties. In this dialog box, you'll see File system: followed by FAT or FAT32 (Microsoft drops the 16).

Make The Choice. If you have Windows 98, FAT32 is recommended, particularly for hard drives or partitions of 8GB or smaller. In a hard drive or partition less than 8GB, cluster size is reduced to only 4KB, which means FAT32 can reclaim a lot of disk space. Microsoft says converting to FAT32 creates up to several hundred MB of extra disk space and will free up 10% to 15% of hard drive space wasted under the FAT16 system. Microsoft also points to advantages of faster loading and use of fewer system resources.

If you have Windows 95, you need to make sure you have the OEM Service Release 2; that's the first version that allows conversion to FAT32. Do this by double-clicking My Computer, then clicking Properties. On the General tab, look for 4.00.950 B or 4.00.950 C by System. That means you have the Service Release 2 and can convert. Any Windows version earlier than this cannot convert beyond FAT16.

If you upgrade from Win95, which uses FAT16, to Win98, which can use either FAT16 or FAT32, you won't automatically be converting to FAT32. Instead, you'll keep FAT16 as the default unless you choose otherwise. Microsoft does not automatically convert the file system because users may have reasons for sticking with their original.

Windows NT users are less likely to convert from the default, security-rich NTFS, because of NT's network environment. However, if you load WinNT and Win98 on the same computer and both OSes require access to the same partition, you'll have to use FAT for that partition. That's not the case if you run only WinNT on a computer accessed by other operating systems through a network. Although Win9x systems can't read NTFS drives directly, they can read them over a network.

Size is occasionally an issue, as well. If you are working with a partition smaller than 200 MB, you'll want to use a version of FAT instead of the larger NTFS. Boyce says, "There is some additional overhead with NTFS. In some situations, FAT32 is going to perform better."

Win2000 offers NTFS as the default, and its main selling point is increased security. In fact, Boyce said, "If security is a critical issue, you don't want to use FAT16 or FAT32."

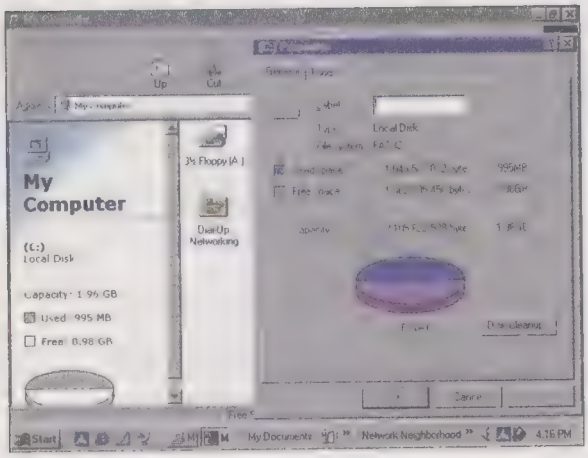
Why Keep FAT? If FAT32 and NTFS are superior, why is FAT16 around at all? Because FAT16 is universally compatible. If you convert beyond FAT16, you can't dual boot to run earlier versions of Windows, such as Windows NT 3.x, 4.0, or Windows 3.0. In addition, a system using NTFS can't boot MS-DOS or Windows 9x, but a system running FAT16 can. Win98 can't boot to NTFS, but both Win98 and NTFS can read FAT16 drives. So if you're dual booting at all, you'll need a version of FAT.

Once you convert to FAT32 or NTFS, you can't go back to FAT16 because there's no conversion tool to go the other way. To get back to FAT16, you'd need to repartition and reformat the drive as well as reinstall your operating system and backed-up files. Because repartitioning erases all data from a drive, it's not a first choice for many users.

Windows 95/98 Conversion Exceptions. You can't convert to FAT32 if your hard drive is compressed with some older compression programs, such as Microsoft DriveSpace or DriveSpace 3.

If your hard drive is removable, and you use it with other operating systems that aren't FAT32 compatible, you won't be able to access your FAT32 drive.

If your laptop uses the hibernate feature, converting to FAT32 may turn off this feature.



As this screen shot shows, we saved significant hard drive space by converting to FAT32.

If for any reason you want to go backwards—uninstall Win98 and return to a previous version of Windows that isn't compatible with FAT32—it won't work.

Some disk tool software is not compatible with FAT32. If you have older versions of this type of software, you may need to check with the manufacturer for an upgraded version. You'll know if that's the case because the conversion wizard checks for incompatibility.

■ **Convert To FAT32 In Win98.** If you've made the decision to convert, a little preparation will make the process fail-safe. First, make a boot disk. To do this, insert a blank diskette in your diskette drive. Click Start, Settings, Control Panel, and then Add/Remove Software. Click Startup Disk and then Create Disk. You will also have the opportunity to back up your system during the conversion process. If you haven't backed up recently, you may want to prepare to do this.

To start the conversion process, click Start, Programs, Accessories, and System Tools. Find Drive Converter. The Driver Converter Wizard asks you which drive you want to convert and lists the C:/ FAT16 as the default. If that's correct, click Next. A warning appears alerting you that some antivirus and disk utilities do not work with FAT32. The wizard then checks your system and lists any incompatible programs. The next screen asks if you want to back up your files before converting. If so, you can click Create Backup to connect directly to this utility.

Once backup is completed or cancelled, the next screen announces that to convert your drive, your computer must be restarted in the MS-DOS mode. Now your computer takes over. The first step is a blue screen informing you that your system is completing a list of tasks, including checking the drive, converting files, and making room for 32-bit FAT. This step takes a few minutes. Next your computer restarts and automatically begins the Disk Defragmenter. This step takes about 45 minutes. When done, you'll receive a message stating that the conversion was successful.

Unfortunately, the converter program won't run if it finds disk errors on the hard drive, whether the errors came with your machine or you've acquired them along the way. To solve this problem, try running ScanDisk. Make sure the Automatically fix errors box is checked.

■ **Convert To FAT32 In Win95.** Keep in mind that Win95 OSR2 is compatible with FAT32; older versions are not. FAT32 does not offer a conversion tool. Partitioning and reformatting the drive is required. You can use the disk partitioning tool that comes with Win95, FDISK. The down side of doing this is that it wipes out all of your data. To start the process, start your computer from a boot disk. Type **FDISK** at the prompt. FDISK will ask you, "Do you want to enable large hard drive support?" Answer Yes, and your drive will be formatted as FAT32.

A better option may be PartitionMagic by PowerQuest (http://www.powerquest.com). This software lets you convert a Win95 hard drive to FAT32 without erasing data.

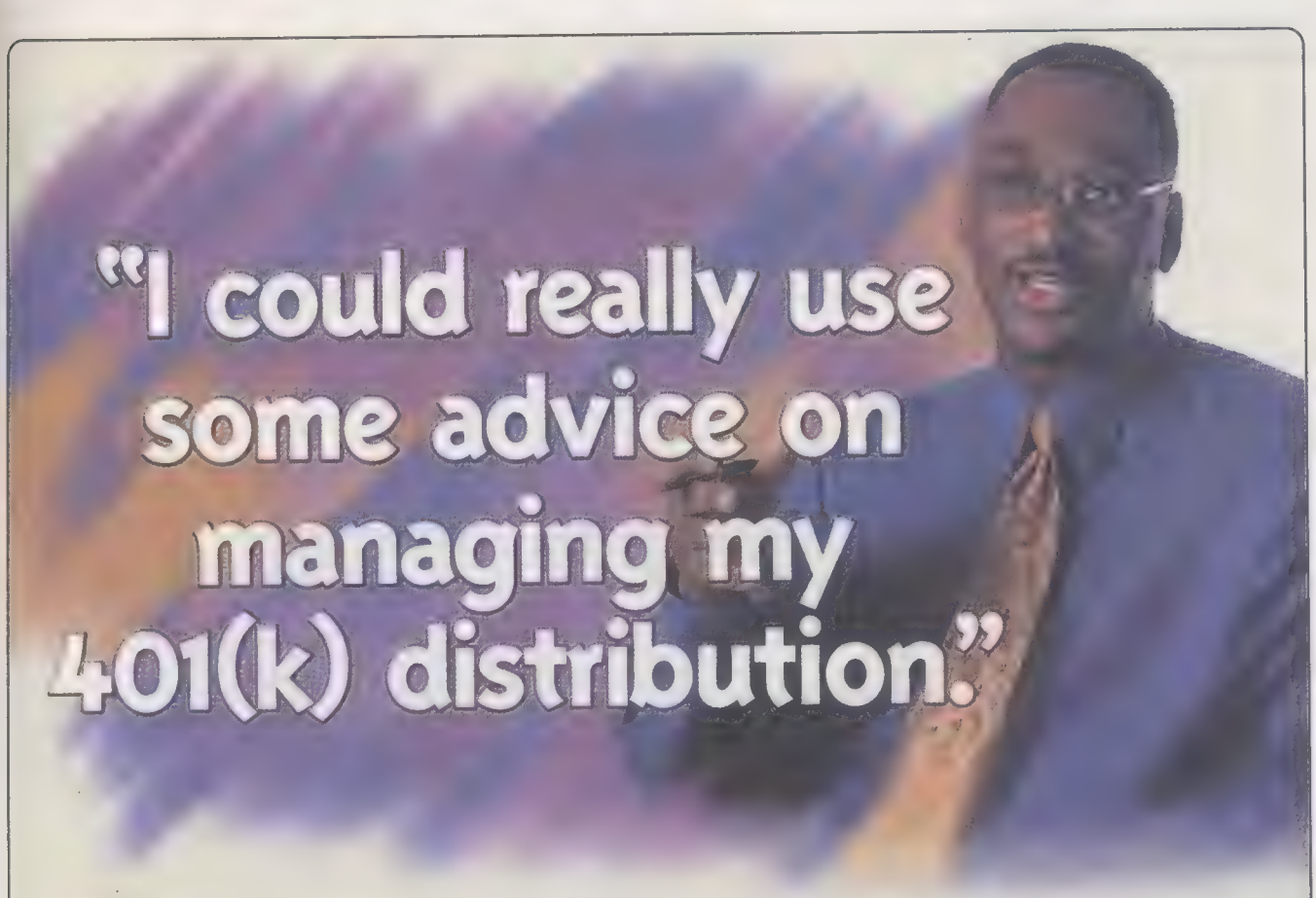
■ **Convert In WinNT & Win2000.** Because there is no wizard to convert file systems in WinNT or 2000, the casual user may find the process time consuming and complicated. To start, you must boot from a system boot diskette and select command line mode during the booting process. To convert the C: drive to NTFS, for example, you would type in **convert c:/fs:ntfs.** LS

by Sonja Carberry

FAT16 & FAT32 Compared

FAT16	FAT32
Most operating systems (MS-DOS, Windows 9x, Windows NT, Windows 2000, OS/2, and UNIX) are designed to implement and use it.	FAT32 can be used in Win2000, Windows 98 and Windows 95 OSR/2.
It is efficient, both in speed and storage, on logical drives smaller than 256MB.	Drives smaller than 512MB are not supported by FAT32.
Disk compression, such as DriveSpace, is supported.	Disk compression is not supported with FAT32.
FAT16 is limited in size to 65,525 clusters, with each cluster being fixed in a size relative to the logical drive. If both the quantity of clusters and their maximum size (32KB) is reached, the largest drive is limited to 2GB.	The largest FAT32 drive can be up to two terabytes, based on the 32KB cluster size limitation.
Storing files in a FAT16 system can be inefficient in larger drives as the size of the cluster increases. The space allocated for storing a file is based on the size of the Cluster Allocation Granularity, not the file size. A 10KB file stored in a 32KB cluster wastes 22KB of disk space.	FAT32 cluster sizes are 4KB (on drives less than 8GB).

Source: Microsoft Windows 98 Resource Kit



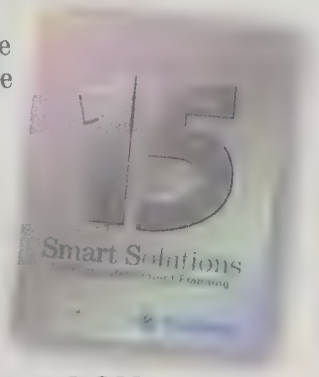
- Prudential Retirement Solutions
- Planning Your Retirement and Beyond
- ▶ Managing Your 401(k) Plan, IRA or Pension
- Protecting Your Estate
- Buying or Selling a Home
- Planning for Business Owners

Whether you're changing jobs or entering retirement, your 401(k) distribution may be the single largest and most critical sum of money you'll have to manage.

At Prudential, we can help make sure you use the money wisely, possibly by directly rolling it over into an IRA* to help avoid unnecessary penalties or taxes. We'll also guide you through a vast array of investment options that may not be available in a 401(k) plan. And we'll offer ongoing advice to help ensure that all of your retirement assets are working together.

For more smart retirement solutions, talk to Prudential.

Call today to find a Prudential professional near you who can help you make a plan for a comfortable retirement. Be sure to ask for our free brochure, *15 Smart Solutions for Better Retirement Planning*.



Call 1-800-THE-ROCK
ext. 6484
www.prudential.com

Prudential

Securities products are offered through Pruco Securities Corporation (member SIPC) and Prudential Securities Incorporated (member SIPC). Both companies are subsidiaries of The Prudential Insurance Company of America, located at 751 Broad Street, Newark, NJ 07102-3777 *Please consult your tax advisor for advice regarding the type of IRA that's appropriate for your situation. If you have employer stock in your 401(k) plan, you may want to consider other strategies. Prudential Real Estate brokerage services are offered in most cases through the network of independently owned and operated franchisees of The Prudential Real Estate Affiliates, Inc. Equal Housing Opportunity
IFS-19991208-A049598

Back To Business

What Windows 2000 Means For You

After nearly four years and $2 billion in development expense, Windows 2000 has arrived. Microsoft's latest Windows version, which, according to the company, involved the efforts of 5,000 employees and 750,000 beta-system testers, was introduced with great fanfare in February.

The product instantly received both praise and criticism. Computing-industry professionals and software reviewers applauded its extensive feature set, security, and stability, while at the same time warning about its incompatibility with older computers; software; and hardware devices, such as sound cards and video cards.

Key Points

- Windows 2000 is Microsoft's newest operating system for businesses.
- The operating system comes in three versions for businesses of different sizes: Advanced Server, Server, and Professional.
- Windows 2000's compatibility problems make it less than ideal for home users.

From the outset, Microsoft promoted Win2000 as a business operating system. It officially replaces Windows NT, which Microsoft incorporated into the new product. At its official release, Microsoft's Bill Gates asserted that the product would finally allow Microsoft to compete with the high-end server market, which is largely dominated by Unix and mainframe systems.

However, Microsoft may have difficulty in this market because the leaders already enjoy a largely satisfied customer base. "I don't see [Win2000] competing with the mainframe and midrange products," notes Dick Sullivan, IBM's vice president of solutions and integration marketing. According to Sullivan, the old adage, "If it isn't broke, don't fix it" prevails here because most large companies can't afford to risk the downtime and system difficulties that can result from changing platforms.

Sullivan and other industry analysts see Win2000 as a good fit for rapidly growing small businesses that need a scalable system that can easily grow with them. Sullivan also sees it as an excellent choice for e-commerce order and customer service systems, which are required to handle complex Internet-related functions and still communicate with "back-office" applications, such as inventory-management and accounting programs that often run on older non-Windows-based mainframe systems.

In this area, Microsoft has to dispel the notion that Win2000 crashes frequently, something that simply isn't acceptable with major e-commerce sites. "These companies know that the right answer is not 'reboot,'" Sullivan says. "If you're not able to respond, you don't just create customer satisfaction problems, you lose business because [customers] go to another company and they stay there."

So far, Win2000 appears to be passing the reliability test. At its official release, Gates offered numerous externally conducted tests that showed the operating system running for 90 days without a crash, as opposed to only a few days with WinNT or Windows 98.

■ **Three Sizes Fit All.** In keeping with its positioning strategy as a product for businesses of all sizes, Microsoft released Win2000 in three different versions: Advanced Server, which is for companies with 25 or more computers; Server, which is aimed at companies with at least five but fewer than 25 computers; and Professional, which is for very small businesses and mobile users. Advanced Server has a street price of $3,999 for 25 licenses, and Server starts at $999 for five. For Professional, new users will shell out $319, but upgrades will

be $219 for Win98 users and $149 for those using WinNT.

Home sweet home? With all this hoopla about the business potential of Win2000, what has happened for the home user? Nothing, for now. Although the original plans for Win2000 were to unite business and home users under a common platform (Win-2000 does combine many of the features of both Win98 and WinNT into one product), Microsoft did not develop Win2000 with the individual user in mind.

Some users, particularly those who perform both recreational and business functions on their computers, may still decide to upgrade, and Microsoft does provide an upgrade path from Win98. However, for reasons that we'll explain later in this article, you shouldn't take this decision lightly. For more information about the differences between Win98 Second Edition and Win2000 Professional, see the "Which Windows Is For You?" sidebar to this article.

Windows Me. Microsoft does plan to release a substantial update of Win98 later this year. Just like Win2000 is targeted toward businesses, this new consumer release, which is named Windows Millennium Edition (Windows Me), will be oriented specifically for home users.

Windows Me uses the same core technology as Win98. According to Microsoft, enhancements will be in digital media and entertainment, Internet usage, home networking, hardware compatibility, and overall system reliability. The product will also include Movie Maker, which is a digital video-editing application.

Other new features include System File Protection, automatic system updates, new Plug-and-Play technology, and tools for gamers and those who work with digital photography. In fact, many business features that were supported in Win98 will not be supported in Windows Me.

A future version of Windows, which is code-named "Whistler," will be available in 2001-2002. Microsoft's current plans are that this version will unite business and consumer users under a common platform, but there will still be separate Whistler versions for each group.

Bit-By-Bit Compatibility. If Windows 2000 is great for small businesses with one or two computers, why isn't it a great choice for home users, too? The problem lies not so much in what Windows 2000 has, but in what it doesn't; namely, across-the-board compatibility. Like its predecessor WinNT 4.0, Windows 2000 is built on the 32-bit WinNT code base. WinNT is a true operating system, as opposed to an operating environment, which means it does not rest on the older 16-bit DOS platform.

WinNT and other 32-bit systems are generally much faster than their 16-bit counterparts because they can move 32 bits of data at a time instead of 16. They also are very stable and secure, largely because they are very picky about which drivers they'll accept.

Windows 95 and Win98, on the other hand, are still based on the original 16-bit DOS environment, even though they can handle both 16- and 32-bit programs. (You'll often see these products referred to as 16/32 bit.) That makes them less stable but more compatible with a wide range of drivers, software, and hardware.

Windows Me will also be based on DOS; Microsoft says it will be the last version of Windows to do so. As long as consumers remain with a DOS-based Windows, they will find that most older devices will work fine. Once they move away from DOS-based operating systems to Windows 2000 or any version of Windows after Windows Me, they may have to replace some equipment.

Problem Solving. This incompatibility issue has been a concern for both businesses and individuals, particularly the "power users" who would normally migrate to Windows 2000. Incompatibility is also the main reason Windows 2000 is not recommended for

Windows 2000 At A Glance

System Requirements:

Professional Edition: Pentium 133MHz or faster processor, 64MB of RAM, and minimum of 2GB of hard drive space.

Server Edition: Pentium 133MHz or faster processor, 128MB of RAM (256MB recommended), and minimum of 2GB of hard drive space.

Advanced Server Edition: Pentium 133MHz or faster processor, 128MB of RAM (256MB recommended), and a minimum of 2GB of hard drive space.

Features:

Windows 2000 is noted for its enhanced reliability, security, and scalability. Some of its most significant features are as follows:

- **Simpler user interface.** Win2000 has streamlined the user interface and made it more intuitive, thus reducing Desktop clutter. The Start menu now shows only the applications you use most often. In addition, the product offers an integrated network/computer/Web search feature and more intuitive help.
- **Easier to use and configure.** New setup and configuration wizards and increased availability of network services help take the guesswork out of setup and operation.
- **Enhanced mobile support.** Win2000 supports all next-generation mobile devices and power sources and offers built-in support for PC cards. However, many mobile users may not have the power to drive it.
- **Support for next-generation hardware.** Win2000 supports USB; FireWire (IEEE 1394); AGP (Accelerated Graphics Port); and high-speed data transfer for cable modems, DSL (Digital Subscriber Line), and other broadband connections.
- **Reliability.** Win2000 is more stable than any earlier Windows product, requiring fewer planned and unplanned system restarts.
- **Security.** Win2000 uses and builds upon the security infrastructure of WinNT. It lets users tailor their systems to the desired level of security.
- **Interoperability.** Win2000 works with most servers, including Unix and Novell.

consumers, especially gamers. According to the research firm Gartner Group, approximately 25% of customers will come across some sort of problem when upgrading to Windows 2000.

For example, at the time of its release, Windows 2000 did not support parallel port Zip drives. This trade-off of incompatibility for reliability has frustrated many high-end consumers. They want the stability of WinNT married with the ease of use and Plug-and-Play compatibility Win98 has.

New Orleans-based musician and composer Michael Leach is a good example. Leach, who uses his computer for mixing audio and video tracks, uses a 550MHz Pentium III system with 192MB of RAM, which is hardly an outdated or underpowered computer by anyone's standards.

Leach uses Win98 for its compatibility but is increasingly frustrated with its instability; however, he says he can't upgrade to Windows 2000 yet. "You're in the middle of 36 tracks and Windows decides it wants to crash," he says. "With Windows being an unstable environment as it is, the last thing I need is for [Windows 2000] to cause more problems. Every manufacturer for every device that I have for both my home and office equipment warns me away from it because of a device conflict."

Patch it up. In addition to device and driver conflicts, the Gartner Group says between 10% and 15% of Windows applications written prior to the release of Windows 2000 will require patches, upgrades, or replacement to work properly. Microsoft has developed a miniapplication, or applet, called the Application Compatibility Program (ACP) that lets you trick older software into running on Windows 2000. Even so, some programs will require certain drivers and other information that physically don't exist on a Windows 2000 system. You'll find ACP in the SUPPORT directory on the Windows 2000 CD-ROM and in the Windows 2000 Resource Kits under the file name of Apcompat.exe.

BIOS issues. A final problem many users will have to deal with is BIOS (Basic Input/Output System) incompatibility. The computer's BIOS controls its startup functions and components such as the keyboard, display, and drives. Many older BIOS chips are not compatible with Win2000 and must be upgraded before Windows 2000 is installed. (BIOS chips cannot be upgraded after installation.)

Microsoft has an excellent upgrade site that lets users check the status of their BIOS, confirm system requirements, and determine the compatibility of their hardware and software. You should point your browser to http://www.microsoft.com/windows2000/upgrade/default.asp and perform the compatibility tests before purchasing Windows 2000.

Which Windows Is For You?

Windows 2000 Professional is designed for business users, but it may have applicability for some consumers. Here's a rundown of the differences between Windows 2000 and Windows 98.

Windows 98 Second Edition

- Best platform for music, pictures, and video
- Best support for PC gaming
- Easy home networking and Internet setup
- Broadest support for consumer hardware and software

Windows 2000 Professional

- Highest reliability to keep your business running
- Enhanced security to protect your business data
- Best support for mobile business computing
- Best platform for next-generation business technology

Call The Exterminator. Another concern for some users is the fact that there are a significant number of defects (bugs) in Windows 2000. Conventional computing wisdom dictates that you shouldn't adopt a new program until the first service update has been posted, and in this case, the wisdom appears to be well-founded.

According to a Microsoft memo that was leaked to the press, the final source code for Windows 2000 contained at least 63,000 bugs at the time of its release. Even before its release, Microsoft had announced that the first service upgrade for Windows 2000 would be released in June.

What's Ahead. Even with the many problems Windows 2000 encountered at its release, industry consensus appears to be that it is a significant improvement over its predecessor and that it will eventually gain widespread acceptance. However, because of its incompatibility problems, that acceptance may be slow to take hold. Incompatibility problems translate not only into extended downtime during the upgrade but also into more money spent. Giga Information Group estimates that the total cost of upgrading to Windows 2000 in a corporate environment could run between $970 and $1,640 per desktop system.

Problems will be especially common with users who are upgrading from Win95 and Win98. That could mean more bad news for Microsoft because WinNT users may be less likely to migrate in the first place because there is less difference between WinNT and Windows 2000. If Win95 and Win98 users are scared away by compatibility problems, sales of the new operating system could be disappointing.

The company's best hope may lie in new computer sales. New computers are less prone to incompatibility problems because developers will write new drivers to work with Win2000. Virtually every major computer manufacturer, including Dell, Compaq, and Gateway, has announced that it will ship at least a portion of its line with Win2000 installed. According to Mike McGuire, analyst at Gartner Group/Dataquest, as much as 50% of all business desktop PCs will ship with Windows 2000 by the end of the year, and notebook PCs that come with Win2000 preinstalled won't be far behind.

For existing users like Michael Leach, the best idea may be to adopt a wait-and-see approach. "I can't wait for the bugs to be worked out of [Windows 2000]," he says. "As soon as the outside manufacturers give the OK, I'll upgrade. I need some sort of a stable environment to work in." LS

by Jennifer Farwell

Installing Windows 2000

What The Newest Microsoft System Needs

This article will deal with how you can determine if your system is ready for Windows 2000. We'll also discuss what Windows 95/98 (Win9x) and Windows NT users (and users with no operating system at all) can expect during installation.

Microsoft's Win2000 site is the best place to start if you are considering Win2000. Point your browser to http://www.microsoft.com/windows2000 to begin. Follow the link called Upgrading To Windows 2000 to determine if your system is ready for Win2000 and to discover your installation options.

The Web site provides four steps you should follow before purchasing and installing Win2000: check system requirements, hardware and software compatibility, BIOS compatibility, and upgrade paths. To determine if your system meets the minimum or recommended hardware requirements, see the "System Requirements" sidebar.

Checking hardware and software compatibility. Microsoft provides a downloadable Readiness Analyzer Tool. The report details any incompatible hardware or software. While the Win2000 installation program also lets you run this routine online during installation, we think it's better to perform this step in advance to avoid nasty surprises. Search for compatible hardware and software on Microsoft's Web site and download Win 2000-compatible drivers.

Determining if your BIOS is compatible. The system BIOS (Basic Input/Output System) on the motherboard is also important to Win2000 compliance because the BIOS controls peripheral configuration and power management. Microsoft defines a Win2000-ready BIOS as one that supports Plug-and-Play configuration of peripherals and uses ACPI power management. Microsoft provides links to ACPI-compatible BIOS upgrades for major-brand systems and peripherals from the Win2000 Web site. For clone systems and upgrade motherboards, check with the motherboard vendor.

Upgrade or replace? The last step is to determine which way you'll install Win2000: as an upgrade or as a separate product. An upgrade will leave you with only Win2000 as your operating system, but it preserves your current application software and settings. A clean install to your existing system lets you dual-boot, so you can keep your existing Win9x programs, but you'll need to reinstall them to use them with Win2000.

You can upgrade from Win9x; WinNT Workstation or Server 3.51 or 4.0; or Release candidates RC1, 2, or 3 of Win2000. You *cannot* upgrade from Win3.1, Win for Workgroups 3.1x, or WinNT Server 3.51 with Citrix software or Microsoft Back Office Small Business Server.

Win2000 can also be installed to a bare drive for testing and evaluation purposes or to avoid any complications from a dual-boot or upgrade installation.

■ **Upgrading From Win9x.** Our test system has a 5.1GB (gigabyte) hard drive, with 2GB for the C: drive and the remainder as D:, running Win95B (OSR 2.0); the system has a CD-ROM drive and a ZIP 100 SCSI (Small Computer System Interface) drive.

If Autorun is enabled on your CD-ROM drive, installation starts when you insert the disc. Installation updates your Win9x OS to Win2000; if this is what you want, click OK. Run Setup.exe from the CD-ROM if you've disabled Autorun. You'll want to accept the End-User License Agreement and enter the 25-digit alphanumeric Product Key from the CD's case or sleeve.

Skip the option to go to the Microsoft Compatibility Web site (see above) if you performed this step earlier. You'll then convert the drive to NTFS (New Technology File System) unless you need to access the drive with MS-DOS or Win9x. NTFS drives are far more efficient and provide better data protection. While you can convert a standard Win9x drive to NTFS later, it's faster and easier to perform this task during installation. Only your C: drive will be converted if you have multiple drives on your system.

The system performs a compatibility check on your system (if you request) and prepares an Upgrade Report; you can skip this step if you used the online Compatibility site before starting the upgrade. After the installation program copies files from the CD-ROM to the system, the computer is rebooted.

After rebooting, the setup program examines your hardware and loads driver files. Then your C: drive is checked for errors, and the file-copy process starts again. Your system is configured and rebooted for the second time.

Key Points

For best results when installing Windows 2000:

- Check compatibility and system requirements in advance.
- Use NTFS if only Win2000 will use the hard drive.
- Know your network settings if you will be performing a clean install.

After the reboot, a fully graphical Desktop appears during the setup process, and your input devices are recognized and set up. Networking components are installed if your system is connected to a LAN (local-area network). At the end of the network components' installation, you may be asked if the computer is part of a domain; if it was already part of a network, this step is omitted.

Additional components are installed and configured, including advanced network features such as COM+. After Final tasks are performed, the system is rebooted again.

When the system restarts, you'll be prompted to press F8 for special startup options; skip this option and let the system boot normally. After Startup, you'll be asked to provide a password for the Administrator and the last logged-in user. Because the passwords for these two accounts will be identical (a single password is used for both), you'll want to assign a new password to the regular user as soon as possible. Otherwise, that person could log on as Administrator and control the entire system!

If your password includes numbers, note that one peculiarity of the Win2000 Startup is that NumLock is turned off. On the Getting Started screen, you can register, set up your Internet connection, and take a tour of Win2000; this displays on each Startup unless you uncheck it. If you already had a working Internet connection, you shouldn't need to use the Getting Started Internet Setup Wizard. Your system is ready to run!

Clean Or Dual-Boot Systems.

If you want to keep your existing operating system, or if you can't upgrade your current operating system to Win2000, install the product as a new installation. We'll cover the differences between this type of installation and an upgrade installation in this section.

Dual boot configuration (Win9x on the system). This installation is similar to the upgrade covered earlier, but with the following differences: If Autorun is enabled, do *not* select upgrade; you can select Install Windows 2000 from the Autorun menu, but select Install A New Copy Of Windows 2000 on the next screen instead.

After you enter the Product Key, you may select or bypass Language, Advanced Setup, and Accessibility options. Use the Advanced Setup menu to choose to copy all your Setup files to your hard drive, specify a different partition for Win2000, or change the name of the default folder.

Make sure you select Win2000 from the operating system's dual-boot menu after the first reboot.

Do *not* select the option to change the partition to NTFS unless you are installing Win2000 into a separate drive partition (this option displays after the first reboot); choosing NTFS will prevent your current Win9x installation from working if you install Win2000 to the same partition (drive) used by Win9x.

After the second reboot, you can customize the System Locale, User Locale, and default Keyboard. These defaults control how you enter and see text, dates, and currencies.

You'll also be prompted to enter your name and your company name. You can accept or change the default computer name. On the same screen, you must also provide an Administrator password. Then, the Current Date And Time and Default Time Zone are displayed; change as required.

You can specify Typical or Custom Network settings; select Custom if you need to use NetBEUI (NetBIOS extended user interface) to connect with other Windows-based systems (the protocol used with Win9x) or IPX/SPX to connect with Novell NetWare 4.x or earlier networks or to specify your TCP/IP (Transmission Control Protocol/Internet Protocol) settings.

After the third reboot, the system brings up the dual-boot menu but will default to Win2000.

If your computer is connected to a network, the Network Identification Wizard runs next. Select whether the computer will use a default name and password or if the computer will ask for name and password every time it's started. If a default name and password are not provided, you'll be asked for name and password to log on to the system.

If you install non-Plug-and-Play hardware, the Found New Hardware Wizard will run. You can have the Wizard search for a driver or identify it yourself from a list of devices.

Bare Drive Installation.

You will need to create four Win2000 setup diskettes by using the BOOTDISK folder on the Win-2000 CD-ROM and running the Makeboot.exe utility from an MS-DOS prompt or the Makebt32.exe utility from within Windows. Use formatted, 3.5-inch 1.44MB diskettes.

Start your computer with diskette one; after a brief check of your system, you are prompted to press F6 if you need to install a third-party RAID (redundant array of inexpensive disks) or SCSI driver.

You'll be prompted to insert diskettes two, three, and four as needed.

After you accept the license agreement, you can partition the hard drive to your tastes. If you press ENTER, the system will turn the entire hard drive into a single drive. To create multiple drives, press C and specify the size you want for the C: drive, then partition the remainder of the drive as D: or as D: and additional drives. It is normal for a few megabytes of space to remain on the drive after partitioning it. Move your cursor to the space now identified as C: and press ENTER to install Win2000.

Unless you plan to install another operating system on the your C: drive, select NTFS at the next screen. Setup will then format each partition and continue the installation process as listed above. LS

by Mark Edward Soper

System Requirements

There are three versions of Windows 2000: Professional, Server, and Advanced Server.

	Professional	Server	Advanced Server
Minimum CPU	Pentium 133	Pentium 133	Pentium 133
# of CPUs Supported	up to 2	up to 4	up to 8
Recommended RAM	64MB	256MB	256MB
Minimum Hard Drive	2GB	2GB	2GB
Minimum Free Drive Space	650MB	1GB	1GB

(NOTE: For better performance, double the amount of RAM and run with at least a 233MHz CPU.)

A Win2000 Walk-Through

Explore New, Industrial-Strength Features In This Windows Powerhouse

You've read the reviews: Windows 2000 Professional, Microsoft's heavy-duty operating system, is not only more stable and secure than Windows 95/98 (Win9x) but also jam-packed with more features. At first glance, however, Win2000 looks almost like a clone of Win9x. Don't let Win2000 fool you; the 2000 model of Windows is more closely related to Windows NT than it is to either of the Win9x models. And like WinNT, it's for business rather than personal use. So let's pop the top of this industrial-strength operating system and explore some of the inner workings and features of Win2000.

The Standard Desktop Icons. The first thing you'll notice about Win2000's Desktop (besides the sea-blue color) is it looks remarkably similar to Win9x's Desktop. And until you start adding additional programs, the icons on your Desktop will be sparse. By default, you will see the My Computer, Recycle Bin, My Network Places, My Documents, and the Internet Explorer icons. Depending on how you or your administrator set up Windows, you'll also probably see a Connect To The Internet icon.

So, just what does each of the standard icons do? The My Document icon is the central storage location for documents you create. However, you don't have to worry about others snooping around in your files if you happen to share your computer with them. Win2000 already has a security measure in place: Every person who logs onto a computer has a unique name and password—and a unique MY DOCUMENTS folder, as well.

You use the My Computer icon on the Desktop to quickly access various locations on your system; it is kind of a launch pad for your various drives. For example, the My Computer window usually includes icons for a diskette drive and your hard drive, as well as the Control Panel. In a similar way, the My Network Places icon helps you quickly lay your hands on resources, such as Web servers, that you share with others in a network environment.

The Recycle Bin operates similarly to the one used in Win9x. Any files, folders, and Web pages you delete from the hard drive aren't gone; they're stored in the Recycle Bin until you empty it (or it runs out of room and begins to dump the oldest files).

You use the Desktop icons the same way you did in previous Windows versions: Single-clicking selects an icon; double-clicking opens it. However, you can change these default settings so you can select an icon by pointing to it and open it with a single-click (which should sound hauntingly familiar if you've used hyperlinks on the Web). To do this, open the Start menu, Settings, and then Control Panel to display the Control Panel window. Double-click the Folder Options icon and display the General tab. Choose Single-Click To Open An Item before clicking OK.

Stay Up-To-Date With Active Desktop. You have two choices of how to use your Desktop area: the traditional Windows Classic Desktop or the Active Desktop. The Active Desktop is a feature that originated with Win9x but is more full-fledged in this version. This feature gives Windows the look and feel of the Web, including the ability to have content from the Web automatically updated on your Desktop. For example, you can view news, investment information, or weather information live on your Desktop. By default, the Windows Classic Desktop is on when you initially load Win2000. To turn on the Active Desktop, open the Start menu, Settings, Control Panel, and then Folder Options. Click the Enable Web Content On My Desktop radio button. You also can right-click a blank area of the Desktop and then check the Show Web Content command on the pop-up menu.

After the Active Desktop feature launches, you can display items, such as the news or weather report, from the Web. To do this, right-click a blank space on the Desktop to display a pop-up menu, choose Active Desktop, and then select New Desktop Item. Enter the address for the Web site from which you want to pull live information in the Location dialog box and then click OK. Alternatively, you can click the Visit Gallery button so you can browse Microsoft's gallery of online items. When you find an item you want, click the Add To Active Desktop link on the gallery page and then choose Yes to confirm your action. Depending on the item you choose, you also may have to click OK in dialog boxes to download files. Wait for Win2000 to match (synchronize) information from the Web to

Key Points

- New Accessibility features make Windows 2000 easier to use.
- Customize your Desktop, Start menu, Taskbar, and other settings.

your Desktop. Close any open dialog boxes, and the new Web content item appears on your Desktop in a separate window.

To make sure the information on your Desktop matches that on the Web, right-click a blank area of your Desktop, choose Active Desktop, and then click Synchronize from the pop-up menu. To temporarily turn off an item's display, click in its window, and then choose the close button that appears in the upper-right corner. Redisplay an item by choosing it from the Active Desktop submenu.

If you tire of the items you added to the Desktop and want to get rid of them for good, right-click a blank spot on the Desktop and choose Properties. Click the Web tab and then select the item you want deleted from your Desktop. Click Delete and then choose Yes to confirm your action. Choose OK to close the Properties dialog box.

To turn off the Active Desktop feature, double-click the Folder Options icon in the Control Panel (click the Start button, Settings, Control Panel) window. Click the General tab, choose the Use Windows Classic Desktop radio button, and then click OK.

Pick A Program. Because Win2000's primary mission in life is as an operating system, the additional software Microsoft bundles with the operating system is limited. However, this isn't a primary consideration for most people. For example, Win2000 comes with Outlook Express, but many businesses opt to load another e-mail program (such as their corporate standard) instead. Additionally, although the typical installation does include a handful of miniprograms, such as Paint and WordPad, you can use for simple tasks, Win2000 also hands you some communication tools such as NetMeeting, which allows you to host an online meeting with users at various remote locations. The Accessibility tools are especially handy for those with limited hearing, sight, or mobility. Finally, administrative tools for managing the system are robust and help you tighten up security. See the "Bundled Applications" sidebar for a full list of programs that come with Win2000.

Create A More Personal Start Menu. The Start menu has much of the same choices as those you know and love in previous Windows versions. However, if you've grown tired of those bloated, ever-cascading menus in Win9x that appear whenever you click the Start button and then Programs, you'll appreciate Win2000's personalized Start menu. How does it work? Win2000 tracks which programs you use the most and then adapts to your work habits by showing only those programs on the Start menu. This is known as the short menu. This condensed menu keeps your Desktop from becoming cluttered and prevents you from experiencing the frustration of trying to accurately click a program from the large, sometimes unwieldy menus displayed in Win9x.

Even though Win2000 initially displays the short menu, you can easily view all available programs by clicking the down chevron symbol that appears at the bottom of each menu listing. If you would rather see the full, unabridged menu every time, simply turn off the personalized menus. To do so, click the Start button, Settings, Taskbar & Start Menu, and then the General tab. Deselect Use Personalized Menus before clicking OK.

Customize Your Taskbar. Another way you can use Win2000 to more

20 Win2000 Tips

1. Quickly minimize all open programs at once by clicking the Show Desktop button on the left end of the Taskbar. To restore the programs to their previous layout, click the button a second time.

2. You can track system use by pressing CTRL-ALT-DELETE and then clicking the Task Manager button. Click the Processes tab to see a readout of how many bytes programs are using; click the Performance tab to see a running graph of the CPU (central processing unit) and Memory Usage.

3. Keep your information away from prying eyes by pressing CTRL-ALT-DELETE and then clicking the Lock Computer button. To unlock the computer, enter your password in the Unlock Computer dialog box and click OK. (*NOTE: Other users can bypass this locked state by rebooting the computer.*)

4. Ratchet up the security level by requiring all users to press CTRL-ALT-DELETE before logging in. Click the Start button, Settings, and then Control Panel. Double-click the Users And Passwords icon and then click the Advanced tab. Check the box for Require Users To Press Ctrl-Alt-Delete Before Logging On and click the OK button.

5. Open the My Computer window by double-clicking the My Computer icon on your Desktop. Then, you can turn off the display of text on toolbars by choosing the View menu, Toolbars, and Customize. Choose No Text Labels in the Text Options field's drop-down menu. Click Close.

6. Set options so Windows completely removes deleted files when you delete them instead of having the Recycle Bin hold them. Right-click the Recycle Bin and choose Properties from the pop-up menu. Check the box for Do Not Move Files to the Recycle Bin. Remove Files Immediately When Deleted. Click OK.

7. Add a descriptive comment to a folder. Open the folder, right-click in a blank area, and choose Customize This Folder. In the Customize This Folder Wizard, check the box for Add Folder Comment, enter your comment in the wizard, and then choose Finish.

8. Retrieve deleted files and folders from the Recycle Bin by selecting the file in the Recycle Bin and then clicking the Restore button on the left side of the screen.

9. To delete the files in the Recycle Bin for good, open the Recycle Bin and then click the Empty Recycle Bin button on the left side of the screen.

11. Determine which programs go unused on your system. In the Control Panel (open the Start button, Settings, Control Panel), double-click Add/Remove Programs. Click the Sort By field's

efficiently work is by displaying or hiding its built-in toolbars on your Taskbar. When you choose one of Window's toolbars, its buttons appear on the Taskbar. To display a toolbar, right-click a blank area of the Taskbar to display a pop-up menu, then point to Toolbars. Choose a toolbar, such as Links or Desktop, from the submenu. To hide the toolbar's display, clear the checkmark for it on the Toolbars submenu.

Work With The Control Panel. You'll also find some differences in the options you have available in the command central part of your system: The Control Panel window. Just as in previous versions, you can quickly display this dialog box by choosing the Start button, Settings, and then Control Panel (or double-clicking the Control Panel icon in the My Computer window).

However, as you carefully analyze the choices, you'll notice some new icons. For example, you will see tools to help administrators manage Win2000 systems, including Administrative Tools and Folder Options. (In the "Working With Windows Components" article, we'll cover these options in detail.)

Manage File & Folders. Win2000 supports three file-management systems that keep track of the contents on hard drives: the old FAT16 (file allocation table 16) system, its improved descendent FAT32, and Win2000's default: NTFS (NT file system). When you first load Win2000, you can choose to use either FAT32 or NTFS. One advantage to using NTFS is you can encrypt files for increased security; you can't use encrypted files on a computer that uses the FAT16 or FAT32 systems. Because switching between file systems is about as graceful as an elephant dancing, you should carefully consider which one you intend to use over the long haul and accordingly set up your system.

Secure Your System. Win2000 includes several security features. For example,

Using The Active Desktop

In Windows 2000, you can use the Active Desktop feature to bring Web-like features and Web content to your Desktop. To perform the following actions, right-click an empty space on the Desktop and click Active Desktop from the pop-up menu. Then, follow the instructions below.

To	Choose this command
Turn the Active Desktop feature on or off	Show Web Content
Display icons on the Desktop	Show Desktop Icons
Freeze the layout of the Active Desktop objects	Lock Desktop Icons
Update Web page content from the Web	Synchronize
Add a new Web item	New Desktop Item

down arrow to open a menu and then choose Frequency Of Use from the menu.

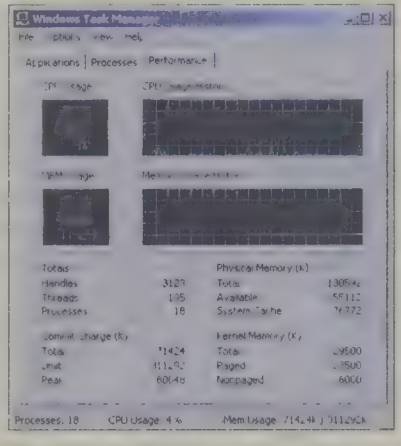
11 Search for files, contacts, or Web sites by right-clicking the Start menu and then choosing Search.

12 Change the home page that appears whenever you connect to the Web. Double-click Internet Options in the Control Panel (click the Start button, Settings, and then Control Panel). Enter a new home page address on the General tab of the Internet Properties dialog box before clicking OK.

13 Share your files with other users. Right-click the folder and choose Properties. Click the Sharing tab and then choose Share This Folder radio button. Click the Permissions button and designate who you'll let use the documents.

14 Start your accessibility programs whenever Windows starts by clicking the Start button, Programs, Accessories, Accessibility, and then Utility Manager. Choose the program(s) you want to automatically launch and then check the Start Automatically When Windows Starts box. Click OK.

15 View Windows' Task Manager by right-clicking the taskbar and then choosing Task Manager from the shortcut menu.



Windows 2000 helps you track system use through the Windows Task Manager.

16 To permanently delete a file without first sending it to the Recycle Bin, select the file and press SHIFT-DELETE.

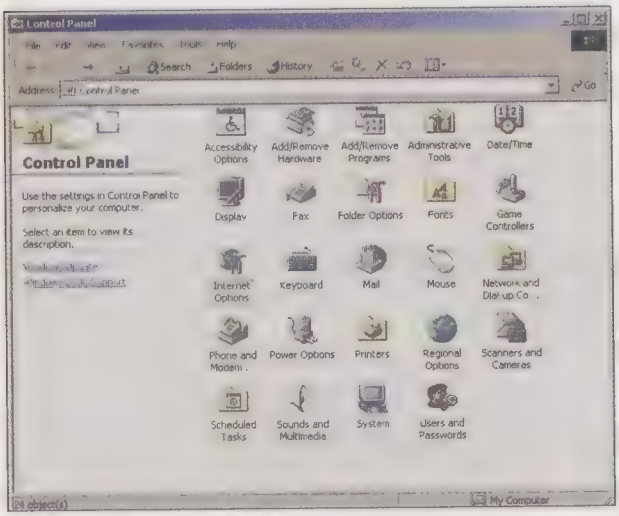
17 Change the way your system uses power by double-clicking the Power Options icon in the Control Panel (open the Start menu, Settings, and then Control Panel), then choosing the options you want.

18 Change your login password by pressing the CTRL-ALT-DELETE key combination and then clicking the Change Password button.

19 View your most recently used documents by clicking the Start menu and then Documents.

20 Quickly view Windows Explorer window by right-clicking the Start button and select the Explore command from the pop-up menu.

unless you have the right to do so, you can't tinker around and make system changes or add programs. When you load Win2000 on a standalone system, Windows automatically designates you as the administrator and lets you make whatever changes you want. On a company network, most likely a network administrator will grant you rights based on your position in the organization and your need to access particular Windows features.



The Control Panel in the Windows 2000 operating system gives you quick access to tools for managing your system.

Administrators have unrestricted access to the system and can perform functions such as adding and removing programs and making major changes to system settings. They also determine the level of control given to other users. Power Users can make changes to the computer and install programs, but can't read other users' files. Restricted users can create, edit, and save documents, but can't make changes to the system. Additionally, Win2000 also includes an Other designation, which is a catchall that includes Guests, Backup Operators, and so on.

Another way Win2000 improves security is by encrypting files to keep those nosey types at bay. If a file is encrypted, it can be used only by the person who encrypted the file or by a registered recovery agent through use of a private key. Keep in mind you can only encrypt files if you are using Windows NTFS. Because Win2000 also can support FAT16 and FAT32, which are used in Win9x, some systems are set up to use these files instead of NTFS. Because of this, their files can't be encrypted.

■ **Use Accessibility Features.** If you've ever squinted at a computer screen because it wasn't readable, had trouble controlling the mouse, or strained your ears to understand your computer's electronic messages, you'll appreciate Win2000's accessibility features.

The Magnifier acts like an electronic magnifying glass, enlarging the area around your mouse pointer and displaying it in a separate pane that is two to nine times larger than your normal screen display. The pane displays in the top sixth of your screen. To turn on this feature, click the Start button, Programs, Accessories, Accessibility, and then Magnifier.

The Windows Narrator does what its name implies: It converts text on the screen, such as that found in dialog boxes, to an electronic, computer-generated voice. To activate the Narrator, click the Start button, Programs, Accessories, Accessibility, and then Narrator. If you don't like the speed and pitch of the computer voice used for the Narrator, you can adjust it by clicking the Voice button in the Narrator box.

If a normal keyboard is hard to manage, you can use Win2000's electronic, on-screen version. To activate the keyboard, choose the Start button, Programs, Accessories, Accessibility, and then On-Screen Keyboard. After you turn on the keyboard's display, click the keys you want to type with the mouse and watch them appear in your favorite program. If clicking the mouse is difficult, you can change the settings so you can just rest the mouse pointer over an electronic keyboard key instead. To do this, choose Settings, Typing Mode in the On-Screen Keyboard dialog box, choose Hover To Select, and then click the OK button.

Even though Win2000's built-in tools are helpful for those with limited mobility, they may not fit the bill for everyone. If you find they aren't robust enough for you, check out additional accessibility tools at the Microsoft Web site (http://www.microsoft.com/enable).

So, take a few minutes to explore Win2000 and discover some of its high-powered and unique features. LS

by Linda Bird

Bundled Applications

Here's a full-blown list of the programs that come bundled with Windows 2000:

- Address Book
- Backup
- Calculator
- CD Player
- Certificates
- Character Map
- Computer Management
- Device Manager
- Disk Defragmenter
- Disk Management
- Dr. Watson
- DVD Player
- Event Viewer
- Fax Service Management
- FreeCell
- Group Policy
- HyperTerminal
- Imaging
- Indexing Service
- Internet Explorer
- IP Security Policy Management
- Local Users and Groups
- Magnifier
- Minesweeper
- NetMeeting
- Notepad
- Outlook Express
- Paint
- Performance
- Phone Dialer
- Pinball
- Private Character Editor
- Removable Storage
- Security Configuration and Analysis
- Security Templates
- Services
- Shared Folders
- Solitaire
- Sound Recorder
- Synchronization Manager
- System Information
- Telnet
- Windows Media Player
- Windows Task Manager
- Windows Update
- WordPad

Troubleshoot Win2000

Tips To Determine The Source Of Your Problem

Receiving an error message is one of the easiest ways to start troubleshooting your Windows 2000 system, but any behavior that is unusual (drive slowdowns, system slowdowns, etc.) can indicate a problem. Record all error messages and watch for patterns: if X always happens when you do Y, for example, that may indicate a problem.

If, despite the problems, your PC starts, and the operating system runs, use the Troubleshooter Wizards built in to the Win2000 help system.

Help Inside Your Computer. The Win2000 help system includes more troubleshooting wizards than ever before. To locate them quickly, click the Start button, choose Help, select the Contents tab, and click Troubleshooting And Maintenance. In addition to listing Win2000 Troubleshooters, you'll also find tips on how to diagnose problems and handle typical drive and system maintenance tasks. The list of Troubleshooters below is arranged by category, rather than alphabetically, as in the actual Help system.

Network And Internet-related

- Client Services For NetWare
- Internet Connections (connecting to an ISP [Internet service provider])
- Modems
- Networking (TCP/IP [Transmission Control Protocol/Internet Protocol], including Internet and networking)
- Remote Access (via modem and dial-up connections)
- Print (printers and configuration)

Software-related

- MS-DOS Programs
- Multimedia And Games (DirectX)
- Windows 3.x Programs

Hardware-related

- Display (monitor and video card)
- Modems
- Print (printers and configurations)
- Sound (cards and speakers)
- Hardware (other types)
- System Setup

After you select a Troubleshooter, you'll be asked a series of questions to help you find the answer. Some Troubleshooters contain links to the tools we'll discuss later in this article.

Help Online. If you can use the Internet, go to http://www.microsoft.com/windows2000/support to check the list of top issues and FAQs for your problem or search the online Knowledge Base if you have a specific error message. To learn more about the tools below, see the Win2000 Technical Library, available online at http://www.microsoft.com/windows2000/library. Technical articles and excerpts from the Win2000 Resource Kit will provide you with additional help for your Win2000 problems.

In the following sections, we'll look at some common problems and at the tools and techniques you should use to solve them.

Windows, Heal Thyself? If you accidentally delete or alter important files in the Win2000 folder, usually C:\WINNT, check the Recycle Bin and restore them if possible. Then, try restarting the system. Win2000 has a new feature called Windows File Protection that can automatically restore some altered or missing system files. If this method doesn't work, see the section below on repairing your Win2000 installation.

If hardware, such as a storage device, stops working correctly, use the Device Manager (right-click My Computer, select Manage, and click Device Manager) to delete the device. Restart your system, and Win2000 will reinstall the device if it's Plug and Play and is on the Win2000 Hardware Compatibility Listing.

Whenever you access the Internet, the Win2000 update program runs, checking Microsoft's Web site for updates that download and install automatically.

Solving Drive Problems. If your system is taking longer and longer to retrieve files or print documents, your hard drive is

Key Points

- You don't need to receive error messages before you begin troubleshooting. If your system slows down dramatically or you're experiencing glitches after installing new software, don't wait for a crash. Use the Windows 2000 Troubleshooters to diagnose and resolve problems.
- Before a catastrophic system crash, use a few of the advanced tools that come with Win2000 to back up everything so you don't lose any important files, system configuration data, or custom settings.

making a lot of noise, or you see disk error messages, your hard drive needs help!

Win2000 offers three tools that can be used to solve and prevent hard-drive problems: Error-checking, Backup, and Defragment. To access these tools, right-click the drive's icon in Windows Explorer (Start, Programs), select Properties, and select Tools.

If your drive is taking a long time to retrieve a file (and may display a blue-screen error asking you to retry), use Error-Checking. This runs a drive-testing program called Check Disk, which is similar to Win9x's ScanDisk, that checks for problems with files and folders. You can also have Check Disk automatically fix system errors and scan for and try to repair bad sectors, which can cause drive-read errors.

Using Check Disk options. Use the following list to determine the best options to select when using Check Disk

If . . . you are testing the drive every week and haven't had any errors
Then . . . run Check Disk with the Automatically Fix File System Errors option selected.

If . . . you are trying to fix reported drive errors but can't manage the process (you're running it while you're away from your drive)
Then . . . run Check Disk with the Automatically Fix File System Errors and Scan For And Attempt Recovery Of Bad Sectors options selected; scanning for bad sectors will require additional time.

If . . . you are trying to fix reported drive errors and want full control of the process
Then . . . run Check Disk with the Scan For And Attempt Recovery Of Bad Sectors option selected; you will be prompted for input when errors are detected.

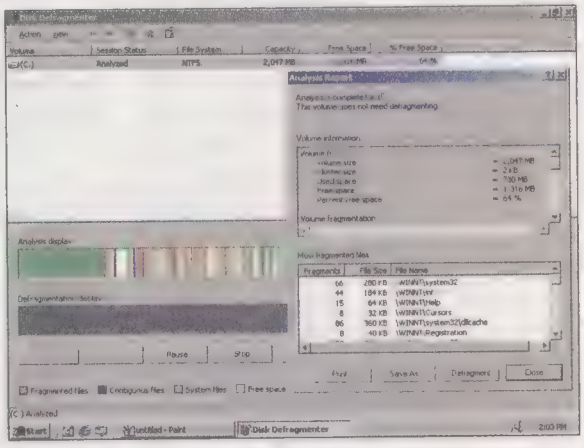
If you boot up in Safe Mode with Command Prompt, you can use the command-line CHKDSK command to perform similar tests.

Using Defragmentation to improve system performance. Every time you start a program, log on to the Internet, or print a file with Win2000, temporary files are created that are eventually deleted by the system. As time passes, Windows must store files in pieces because there is no longer enough contiguous space for files. This causes system performance to decline because multiple movements of a drive's read-write head are required to locate all portions of a file. This file fragmentation, in extreme cases, can appear to the user like a failing drive because the elapsed time required to load a file is so much longer than before.

Use Error-Checking first, then use Defragmentation to place every file into a single group of clusters. The Win2000 version provides a detailed graphic and optional text report analysis to help you determine when the drive needs to be defragmented.

Backup. The Win2000 Backup program is the third tool you can use to prevent and solve problems. Make backups of your system before you install new software or of data files only to help you recover from a drive problem. Another important function of the Win2000 Backup program is to let you create the ERD (Emergency Repair Disk), which can be used to repair a damaged Win2000 installation or restart Win2000 in the event of problems.

As with Defragmentation, use Error-Checking first to make sure your drive is in good condition before starting the Backup process. You can back up to both drive-based and tape-based removable storage drives.



Use both the visual analysis and text reports available with the Disk Defragmenter tool to determine when to run it.

The Emergency Repair Diskette. The ERD (Emergency Repair Diskette) is an important part of the process that is used to correct a damaged Win2000 installation. You create it with the Emergency Repair Disk Wizard in the Backup program. When you make the ERD, you should select the option to Also Backup The Registry To The Repair Directory, which creates a folder called RegBack in the C:\WINNT\REPAIR folder and copies your system Registry to the folder. In the event of a serious system failure, having a copy of the Registry makes recovery easier.

Because ERD makes a copy of the Registry, create a new ERD after each major change you make to a system, such as adding new hardware or installing new programs. Because using the ERD to repair your system reverts it to the status at the ERD's creation date, using an out-of-date ERD will lose any configuration changes.

If Win2000 becomes damaged, and your system can't start normally, restart the system with the Win2000 CD-ROM or with the Setup diskettes that you created when you first installed Windows 2000. After the Setup program starts, you'll be prompted to press **R** to repair the installation. You have two options on the next screen: press **R** to start the emergency repair process or press **C** to start the Recovery Console. (See below.)

On the next screen, you can choose to press **M** (manual) or **F** (fast) repair. In most cases, you should choose Fast repair as your first option. Press ENTER on the next screen to use the ERD and insert it as prompted. Press ENTER to start the recovery process. After analysis and repairs, you'll be prompted to remove the ERD as the system restarts. If a Fast repair fails, you can try Manual repairs with the ERD.

Manual repair lets you choose from the these options: Inspect Startup Environment, Verify Win2000 System Files, or Inspect Boot Sector. By default, all three are selected; you can select only the tests you like. A Manual repair is more thorough than a Fast repair and lets you see which file needs to be repaired and lets you repair or skip each file or repair all files automatically.

In our testing, in which we deleted files in several system folders, Fast repair didn't work, but Manual repair worked flawlessly, even when we let it make all fixes itself. If the Manual repair process fails, you'll need to perform a full reinstall of Win2000 from the original media.

Special Startup Options. You can solve some Win2000 problems by starting the system in one of several special modes. Press the F8 key at Startup when the system displays Starting Windows to see the Advanced Options menu for Startup options.

Unlike Win9x, which used confusing numbers as well as text labels, the Win2000 Advanced Options are identified strictly by

text labels. They include: Safe Mode, Safe Mode With Networking, Safe Mode With Command Prompt, Enable Boot Logging, Enable VGA Mode, Last Known Good Configuration, Directory Services Restore Mode (domain controllers only), Debugging Mode, and Boot Normally.

Use the cursor keys to select an option and press ENTER to continue.

Safe Mode options. Safe Mode doesn't load 32-bit drivers, but it runs in standard VGA mode and disables user customization, such as Startup programs, to bypass potential trouble spots. Because BIOS (Basic Input/Output System) services are used to run hard drives, system startup is very slow. You'll see Safe Mode in all four corners of the screen.

Use Safe Mode to view settings in the Device Manager for devices and to add, change, and remove the devices, software, and drivers. Unlike Win9x, Device Manager in Safe Mode will display the hardware resources (IRQ, DMA, etc.) used by devices. Restart the system after you use Safe Mode. To maintain a network connection with Safe Mode, choose Safe Mode With Networking.

Use Safe Mode with Command Prompt if you need to use Recovery Console options to repair your system. (See below.)

One oddity of Safe Mode is that some serial mouse devices won't work.

If you suspect that a defective video driver is the cause of system problems, use Enable VGA Mode instead; this uses a standard 640 x 480 resolution, 16-color VGA driver in place of your normal video driver but retains all other normal 32-bit drivers.

Using Boot Log. To determine whether all drivers and services used by Win2000 are loading properly, select Enable Boot Logging from the Advanced Options startup menu. The Boot Log is a text file that records all activity during the Win2000 startup process. This file is stored in the default Win2000 folder (normally C:\WINNT) and is called Ntbtlog.txt. So you can compare the differences between a system working normally and a system with problems, make a Boot Log and change its name to Normal_bootlog.txt as soon as your system is fully configured and after every major hardware change. Then, you can use the Boot Log feature when your system has a problem to help you see the differences.

If you start the system in Safe Mode, a Boot Log is automatically generated; this Boot Log file will list both the drivers that are loaded and those that are skipped in Safe Mode.

Using Last Known Good Configuration. If you install new hardware or software, and Win2000 stops working, restart the system and choose the Last Known Good Configuration from the Advanced Options startup menu. If the system works properly, this indicates the changes made didn't work. Restart the system in Safe Mode and uninstall the hardware or software that caused the problem.

Using the Recovery Console. If you're an old DOS hand, you'll appreciate the Recovery Console, which lets you run Win2000-specific versions of classic MS-DOS commands (and some new ones) to repair a seriously damaged system. Start it from the Win2000 Setup Repair option. (See above.) The Recovery Console resembles the familiar command prompt but will work only with the current Win2000 installation and not with folders used for programs or documents.

In addition to familiar commands, such as DIR (directory), CLS (clear screen), MD (make directory/folder), CD (change directory/folder), RD (remove directory/folder), DEL, and COPY, you can also run the following drive-repair tools from the Recovery Console:

fixboot: This command copies boot sector files to a drive; use it if the drive's boot sector files are missing or damaged.

fixmbr: This command restores the MBR (master boot record) to a drive; use it if the MBR has been damaged by a virus or by other problems.

map: This command lists the current drive letters, types, and other drive information; use it to determine what drives are on your system.

diskpart: Similar to MS-DOS/Win9x's Fdisk, this command lets you delete and create drive partitions; data on existing partitions will be lost when partitions are deleted.

Other useful commands include:

expand: Use this command to manually retrieve a file from a compressed .CAB file on the Win2000 CD-ROM and copy it to the hard drive.

enable /disable: Starts or stops specified services.

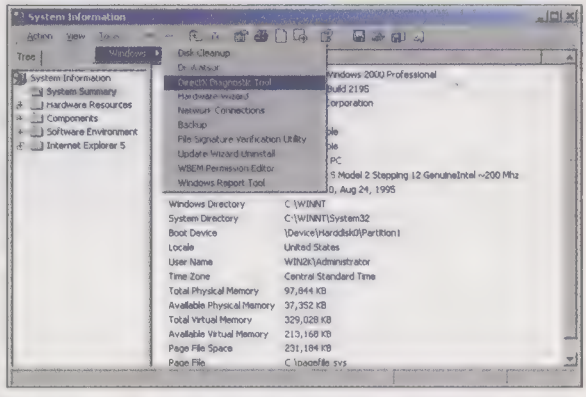
attrib: Changes file attributes; incorrect file attributes can prevent system files and folders from working.

/?: type **/?** after each command to get the details for using each command.

EXIT: Type **EXIT** to stop the Recovery Console and restart the system.

Use System Information.

If you need hardware and software details for troubleshooting, the single best source of information about your system is Microsoft's System Information, which you can run from Start, Programs, Accessories, System Tools. The opening screen identifies major system facts, including Win2000 release, physical and virtual (swapfile) memory, CPU type and speed, Windows folder, and time zone. Click the left-side menu to get incredibly detailed information about hardware resources, hardware components, software, and the integrated Internet Explorer 5.0. As you click some parts of the listing, there is a short delay while the system is checked for updated information.



The Microsoft System Information tool provides a detailed look at both hardware and software.

If you check on Components, Multimedia, CD-ROM, for example, you'll learn the CD-ROM drive's letter, the model number and manufacturer of the drive, the status, its transfer rate (if media is on-board), and even its Plug-and-Play ID. Use System Information, and you can avoid removing the cover to learn about drive details in many cases. System Information is also the launch pad for advanced troubleshooting tools, including Disk Cleanup, which finds temporary files you can delete to free up drive space; Dr Watson, which captures the system condition when a system crashes; DirectX Diagnostics, which helps you test and repair DirectX drivers for gaming and multimedia; and others. LS

by Mark E. Soper

Win98 System Requirements

Don't Let The Minimum Fool You

Microsoft boasts low system requirements for both Windows 98 (Win98) and Win98 Second Edition (SE). Microsoft's *Getting Started* manual says: on a 486DX CPU (central processing unit) with 66MHz (megahertz), 24MB (megabytes) of RAM (random-access memory), and between 125 and 355MB of free hard drive space, you can upgrade to Win98SE. These requirements are just slightly higher than the 16MB of RAM considered minimum for Win98.

Realistically, running Win98SE on a PC with the minimum requirements will slow down boot time and software launches, and you may experience more frequent crashes.

With both versions of Win98, you'll enjoy new features and easier navigation in an environment that looks like Win95. But on a PC with the minimum requirements, remember the old adage: buyer beware. Performance suffers on low-end machines. And according to Microsoft, "more memory improves performance."

How much RAM should your PC have to run Win98SE? You will want at least 32MB; some technicians recommend at least 64MB.

To get the kind of performance that will keep you computing quickly and efficiently, you will want to install it on a Pentium machine.

Remember when considering an upgrade: Win98SE includes more than 1,200 new drivers, and many existing computers or devices may need an updated BIOS (Basic Input/Output System) or device driver. If you're running Win98 on an adequate system with at least 32MB of RAM, upgrading to SE is an easy choice. Before committing to Win98SE, consider the enhancements vs. the performance. With more than the minimum system requirements, the following enhancements can improve your computing experience.

Internet Functionality. Both Win98 and Win98SE have dramatically improved Internet functionality. And not only does Win98SE improve Internet functionality, but it also improves multimedia functionality, all of this through the newest versions of Internet Explorer, Outlook Express, NetMeeting, DirectX, and Windows Media Player.

Internet Explorer 5.0 lets you Web surf more easily. Outlook Express makes e-mail easy. NetMeeting 3.0 improves file transfer and real time, long distance collaboration through Internet phone or videoconferencing. It even has a virtual whiteboard where you can collaborate on drawings. DirectX 6.1 has more multimedia formats, including Mesia, MP3, WAV, AVI (Audiovisual Interleaving), and MPEG (Motion Picture Experts Group). For users who want to watch movies on their PCs, Win98SE's DVD (digital versatile disc) support will make an upgrade worth the price.

Win98SE's most significant enhancement is its Internet connection-sharing capabilities, which lets users create home networks. With Win98SE, users can network the entire house using Internet Connection Sharing network address translation and DHCP (Dynamic Host Configuration Protocol). You can install PCs (and connect to the Internet) anywhere in your home, using the same modem and dial-up connection. Users can simultaneously access different Web sites from different PCs, eliminating the cost of multiple phone lines.

Another reason to upgrade is to improve Web access. With Win98SE's support of broadband Internet access, you can upgrade to xDSL and cable, which means faster access.

Finally, Win98SE provides improved support for USB (Universal Serial Bus) peripherals, which makes it easy to add and remove PC accessories. It also supports IEEE 1394 high bandwidth connections, making it easy to connect digital cameras and storage devices.

Along with these enhancements come performance issues that may influence your decision to upgrade. Win98SE consumes system resources to create the Active Desktop, which makes your Desktop look and feel like a Web page. You may appreciate Active Desktop if you have Web pages or JavaScript tickers in place of wallpaper, but it's a huge drag on your PC's speed. You can deactivate Active Desktop; it's a necessity if you're running a 486DX and want reasonable performance. Other applications, such as Microsoft Office's Fast Find, start up with Win98SE and run in the background. After an upgrade, take stock of these applications and remove those that you don't need. LS

by Jan Knudsen

Key Points

- Before upgrading to Windows 98 Second Edition, ask yourself if the enhanced performance justifies the increased cost in terms of price and additional system requirements.
- Low system requirements, such as 24MB (megabytes) of RAM (random-access memory) on a 486DX CPU (central processing unit), might mean you can install Win98SE, but performance will be compromised.

Win98 Secrets

Explore These Hidden Features & Tricks

Windows 98 made profound changes in how you view the Desktop and in how it works, and the operating system also added new navigation features and some cool multimedia tools. Windows 98 Second Edition introduced even more new features, including a built-in ability to share an Internet connection. We'll run down some of these newer features and show you some tricks you can use in Win98.

New Desktop view options. Win98 offers two views of your Desktop: Classic and Web. Classic view shares many similarities with Windows 95's interface; Web view is more akin to how your Desktop would look if you used a browser to view it. Each view has strong and weak points. If you're upgrading from Win95, it may be easier to get used to Classic view; if you like how a browser works, you'll feel right at home with Web view.

One of the major differences between the two views is how you select and see information about items on your Desktop. In Classic view, you select an object by clicking its icon, and you open a folder or launch a program by double-clicking its icon. In Web view, you place your mouse over an icon to select it and click to open a folder or launch a program, just like clicking once on a Web hyperlink.

We will use the following conventions for this article: "Select an item" means to either click (Classic view) or place the mouse pointer over an item (Web view). "Open" or "launch" means to double-click (Classic view) or click (Web view) an object.

Key Points

- Win98 lets you choose your preferred Desktop view.
- New toolbars provide faster access and easier navigation.
- New multimedia tools support streaming formats and WebTV.

Choosing a Desktop view. Look at the icons on your Desktop to determine which view you use. If icon names have an underline, you use Web view. If icon names don't have an underline, you use Classic view. To change from one view to the other, open the My Computer icon on your Desktop. From the My Computer menu, choose View, Folder Options. In the Folder Options dialog box, click the General tab and then choose either Web Style or Classic Style. Click OK to save your changes.

Another way to access folder options is to select Settings, Folder Options from the Start menu.

In addition to Web Style and Classic Style, there's a third folder options choice. The Custom option combines elements of both Classic and Web views. To create a custom view, select the Custom option and then click the Settings button. In the Custom Settings dialog box, you can choose Enable All Web-Related Content On My Desktop or Use Windows Classic Desktop. Other choices include whether folders should open in the same window or in separate windows and whether Web view will display for all folders or only for specified folders. You also can decide whether icons open by clicking or double-clicking them. Try using Classic view for a while, then Web view. Once you're familiar with both, select the one you're most comfortable with or use Custom view to combine the best of both.

Windows 98 icons. Both Classic Style and Web Style display classic Desktop icons. There are five basic types of icons, each of which performs different functions.

1. Desktop icons. Although users generally refer to all icons on the Desktop as Desktop icons, true "Desktop" icons, including My Computer and the Recycle Bin, are permanent features of the Desktop and you cannot remove them. Desktop icons usually provide easy access to Win98 tools or services. The Recycle Bin lets you throw items away; My Computer provides a bird's-eye view of the services and directories available on your computer.

2. Folder icons. These icons look like tabbed manila folders and represent folders (previously known as directories in DOS). Opening a

folder produces a window displaying the contents of the folder.

3. Program icons. Program icons are specific to a program. Although their appearances can vary greatly, they are almost always named after the program they represent. Opening a program icon launches the program the icon represents.

4. Document icons. You create document icons when you save a document. Document icons usually have a dog-eared corner, like a folded piece of paper. Opening a document icon launches the associated program and displays the selected document.

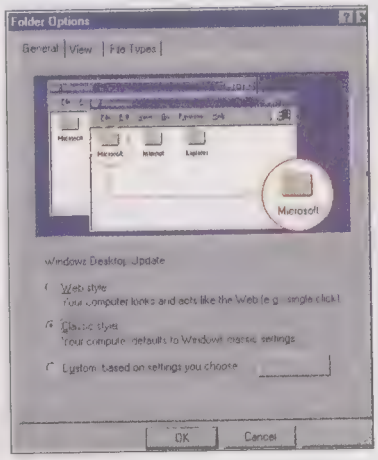
5. Shortcut icons. Shortcut icons, easily distinguished by a small arrow in the lower left, are pointers to items on your computer. They can point to folders, programs, documents, and even hardware devices such as a diskette, Zip disk, or CD drive. Shortcuts are a way to quickly gain access to an item without digging down through menus or folders.

You may come across other types of icons, but most fall into one of the above categories.

Make the icons perform. Every icon performs a specific function; most can perform more than one function. If you wonder what you can do with an icon besides launch a program or open a file, place your cursor over an icon and right-click to bring up a context-sensitive pop-up menu. The menu lists ways you can manipulate the selected icon. One of the items will be in bold characters. That means it's the default function, the one performed when you click the icon. The default function is usually Open, although not always. For example, a folder or program icon's default function is Open, but a dial-up connection icon's default function is Connect.

Desktop icons allow quick access to most of your computer's functions and applications. They may not always be the easiest way to launch programs or view folders, though, especially when the Desktop gets crowded with open windows.

Unearth the Quick Launch toolbar. Win95 introduced the Start menu; many programs now install a shortcut in the Start menu to provide quick access. Win98 added a few new features that make navigation even easier. One obvious change is to the Taskbar, which now includes a Quick Launch toolbar to provide fast access to your favorite programs. The default Quick Launch toolbar includes buttons to launch Internet Explorer (IE), start Outlook Express, or view the IE Channel guide, along with the Show Desktop button. Show Desktop quickly minimizes all open windows to reveal the Desktop. If all windows are already minimized, Show Desktop restores the windows to where they were before you minimized the last window.



Win98 offers two views of your Desktop, Web Style and Classic Style, plus the option to combine your favorite parts of both styles.

You can hide or display the Quick Launch toolbar by right-clicking any vacant spot in the Taskbar and choosing Toolbars, Quick Launch from the pop-up menu.

To expand or shrink the Quick Launch toolbar, double-click the vertical bar at the left end of the toolbar.

You can resize the toolbar to reveal or hide buttons by dragging the vertical bar of the toolbar adjacent to the Quick Launch toolbar (usually the Taskbar). Place the mouse cursor on top of the vertical bar until the cursor changes to a double arrow, then drag the toolbar to its new size.

You can separate the Quick Launch toolbar from the Taskbar and place it anywhere on your Desktop. Put your cursor over the Quick Launch toolbar's vertical bar then drag the toolbar up into the Desktop area. Release the mouse when the toolbar is at the desired location. Drag the toolbar back to the Taskbar to reunite them, or simply close the toolbar. When you reopen the Quick Launch toolbar, it will be back with the Taskbar.

Alter buttons on the Quick Launch toolbar. To add a button to the Quick Launch toolbar, right-click an item or a shortcut and drag it to the toolbar. A small black vertical line appears to indicate where the new button will insert. When you're satisfied with the new button's location, release the mouse button. Select Create Shortcut Here from the pop-up menu. To access the item, simply click the new button in the Quick Launch toolbar.

To remove a button, right-click the button and choose Delete from the pop-up menu.

To reorganize Quick Launch toolbar buttons, place the mouse cursor over a button and click and hold the mouse to drag the button. A black vertical bar will appear to indicate the new location. Release the mouse button to complete the move.

The Desktop toolbar. Win98 includes other new toolbars to help you quickly access information. The Desktop toolbar is handy for accessing items on the Desktop that have become hidden by open windows. You can close or minimize windows to gain access to Desktop items, but the Desktop toolbar is faster.

To display the Desktop toolbar, right-click any vacant area of the Taskbar and select Toolbars, then choose Desktop from the pop-up menu. You can manipulate the Desktop toolbar just like the Quick Launch toolbar. It also

New Windows 98 Toolbars ▶

- ✓ **Address:** Type in a URL (universal resource locator) to launch IE and go to a Web page
- ✓ **Links:** Displays the Links folder from IE's Favorites menu
- ✓ **Desktop:** Quick way to access Desktop items hidden by open windows
- ✓ **Quick Launch:** Provides fast access to your favorite programs
- ✓ **Custom:** Provides fast access to groups of items, such as folders or hard drives

has an additional feature that makes it attractive to use. You can minimize the toolbar by either double-clicking the vertical bar at its left end or dragging that bar to the right until only the word Desktop and two right arrows appear. Click the arrows and you will see a pop-up menu of all items on your Desktop (pop-up menu requires Win98 Second Edition or IE5). Since the Desktop includes the My Computer icon, you can use the pop-up menu to access any file on your computer.

Links and Address toolbars. You also can add the Links and Address toolbars to your Taskbar. Right-click a vacant area of the Taskbar and choose Toolbars, Links or Toolbars, and Address from the pop-up menu. The Address toolbar displays the address bar from Internet Explorer. Entering a URL (universal resource locator) in this toolbar will launch IE and take you to that Web page. The Links toolbar displays items from the Links folder of the IE Favorites menu. You can minimize the Links toolbar just like the Desktop toolbar, providing quick access to your favorite links via a pop-up menu.

Custom toolbars. To add a custom toolbar, right-click any vacant area of the Taskbar and select Toolbars, and then New Toolbar from the pop-up menu. Select a folder from the list in the New Toolbar dialog box. Items in the folder will become buttons on the new toolbar.

If you use more than one dial-up connection, an Internet connection toolbar can be handy. Select the Dial-Up Networking folder from the New Toolbar list and click OK. Once you have created the toolbar, minimize it by dragging the vertical bar. You now have a small Dial-Up Networking toolbar with a double arrow you can click to provide a pop-up menu of all your dial-up connections (pop-up menu requires Win98 Second Edition or IE5). If you want to access all your Internet services from a single toolbar, create a folder on your Desktop and call it iConnect. Place shortcuts to all your Internet services in this folder—dial-up connections, MSN, America Online, EarthLink, and any others—and select this folder when you create the custom toolbar.

New multimedia tools. Now that you've filled up your Taskbar, what else does Win98 have to offer? For starters, there's an array of new multimedia capabilities, from the Media Player, which supports many Internet streaming formats, to WebTV, which lets you watch television on your computer.

To make full use of WebTV, you'll need a TV tuner card in your computer. Some video cards come with a built-in TV tuner. If you're not sure about yours, check with the manufacturer. Even if you don't have a TV tuner, you can still use WebTV to view, search for, and remind you of cable, broadcast, or satellite programs in your area.

Even if you can't (or don't want to) watch television on your computer, you can still use WebTV to look up or remind you of your favorite programs.

Install WebTV. WebTV is an optional installation item, so it may not be on your computer. To install WebTV, insert your Win98 installation CD into your CD drive. Select Add/Remove Programs from the CD menu and click the Windows Setup tab. Scroll down the list of categories until you find WebTV For Windows. Highlight WebTV For Windows and then click the Details button. Put a checkmark next to WebTV For Windows and then click OK. Click OK again to start the installation process. Follow the on-screen instructions to complete the installation.

Once installation is complete, and you've rebooted your computer, you'll see a new button on the Quick Launch toolbar that looks like a television. Click this button to launch WebTV. The first time you run WebTV, you'll be taken through a setup routine. Follow the on-screen instructions to complete the setup.

To find out what's on television tonight, click the TV button in the Quick Launch toolbar. If you have a supported TV tuner card installed, you also can watch your favorite programs right on your computer, either in a small window or using the entire display.

Internet Connection Sharing. Many households have more than one computer but only one Internet connection. ICS (Internet Connection Sharing) lets users of networked computers simultaneously share a single Internet connection.

Select one of the networked computers to be the host computer. Install and configure ICS on that computer by inserting the Win98 SE installation CD into the CD drive. Select Add/Remove Programs from the CD menu, then click the Windows Setup tab. Select Internet Tools and click the Details button. Place a check mark next to Internet Connection Sharing and click OK. Click OK again to start the installation.

When the ICS Wizard appears, click Next to start the setup process. You'll be asked to create a Client Disk, which you will use to set up ICS on your other computers. Follow the on-screen instructions to complete the process. When you've created the Client Disk, click Finish to complete the installation.

After your computer finishes rebooting, select Settings, choose Control Panel from the Start menu, then select Internet and click the Connections tab. Click the Sharing button, then place a check mark next to Enable Internet Connection Sharing. Click OK to accept your settings. Click OK again to close the Internet dialog box.

To set up the client computers, insert the Client Disk into each client's diskette drive and select Run from the Start menu. Type **a:\icsclset.exe** then click OK. The browser connection setup wizard will start. Click Next to continue. The wizard will make changes to your connection settings, configuring your browser to look to your LAN (local-area network) instead of a dial-up connection whenever you use the browser. Click Finish to complete the setup.

Since the client computers depend on the host computer being active, you might want to make one change to the browser connection function. On your client computers, open the Control Panel, Internet Options and click the Connections Tab. Select Dial Whenever A Network Connection Is Not Present. This lets you access the Internet even when the host computer is turned off. LS

by Tom Nelson and Mary O'Connor

Customize Win98

Putting The Pieces Into Place & Making Yourself At Home

Key Points

- Customize the appearance of Windows by changing such things as the wallpaper and screen saver or choosing a Desktop theme.
- Customize the way Windows behaves or responds by setting preferences that make it act like the Web or by controlling settings for the mouse, keyboard, or sound effects.
- Customize Windows for your own productivity and organization when you tweak things such as the Taskbar, the toolbars, and the Start menu.

You won't have to work in Windows 98 Second Edition very long before you realize that most of the many customizations it allows you to make fall into one of three main categories: appearance, behavior and response, and productivity and organization.

Change the background. Right-click anywhere on the Desktop, and choose Properties to open the Display Properties dialog box. Select the Background tab to pick an HTML (Hypertext Markup Language) document or a picture to use as wallpaper. If you don't see anything you like, click Browse to find a picture or HTML document you may have stored somewhere else. Click the Pattern button to choose a pattern, such as bricks or triangles, to fill in any leftover screen space around your background image. Finally, use the Display drop-down menu to tell Windows whether you want the object centered, stretched, or tiled across your Desktop.

Choose the screen saver. Right-click the Desktop and choose Properties. When the Display Properties dialog box opens, select the Screen Saver tab. Scrolling through the Screen Saver drop-down menu reveals more than 20 different options. Click a screen saver to preview it on the minimonitor in the dialog box. When you've made your selection, you can click the Settings button to control the speed and shape of the screen saver's activity as well as its density and colors.

Next, fill in the Wait field with the number of inactive minutes you want Windows to allow you before it starts the screen saver. If you don't want anyone else to change your screen saver, protect the settings by placing a check in the Password Protected checkbox and clicking the Change button to select the password.

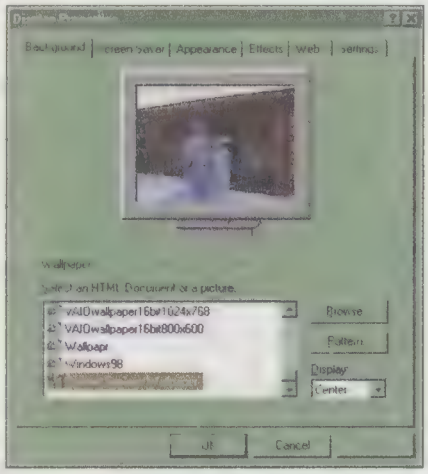
Alter the appearance. Again, open the Display Properties dialog box by right-clicking the Desktop and choosing Properties. This time, select the Appearance tab. Here, you have the option to pick and choose from several preset Desktop color schemes in the Scheme menu, such as the green Spruce scheme or the Rainy Day theme that leans heavily on blueish grays.

Customize a scheme or create one of your own by using the Item drop-down menu to specify sizes and colors for all the Desktop components, from icons to title bars. Find your favorite font in the Font drop-down menu and specify the size and color in which you want it to appear on your Win98 Desktop.

Affect change with effects. If you choose the Effects tab in the Display Properties dialog box (right-click the Desktop and choose Properties to open it), you'll be able to customize things such as your Desktop icons. Select an icon, such as My Computer or My Documents, and click the Change Icon button to assign a different icon to the folder or

shortcut. Select or deselect the options under Visual Effects to tell Windows such things as whether to use large icons, to show icons using all possible colors, and to show the contents of a window while you are dragging it.

Use themes for your Desktop. Open the Desktop Themes dialog box by going to the Start menu, choosing Settings, Control Panel, and then Desktop Themes. If you don't care for the standard Windows look, try Baseball, Nature, Sports, Travel, or one of the many other theme options in the Themes drop-down menu. Themes include a screen saver, sounds, mouse pointers, Desktop wallpaper, icons, colors, font names and styles, and more. If you don't see Desktop Themes in your Control Panel, you'll need to install it first from the Win98 installation CD-ROM.



You can change numerous items and settings from the Display Properties dialog box, including wallpaper, screen savers, display settings, and Desktop icons.

Within the Desktop Themes dialog box, you'll see a preview of the theme's wallpaper and colors, and you can click the Screen Saver button to preview each theme's screen saver. Click the other associated buttons to see what they have to offer. For example, see what the mouse pointer looks like in different situations, such as normal, unavailable, busy, or working in background. You can also test the sounds each theme associates with various events, and you can check out the icons used for visual elements such as My Computer or My Documents. When you find a theme that fits you, click Apply, then OK.

Bring the Web to the Desktop. With a click of the mouse, you can make your Desktop behave as a Web page. Right-click the Desktop and choose Properties to open the Display Properties dialog box. Under the Web tab, you have the option to view your Active Desktop as a Web page (meaning that you can subscribe to channels from the Desktop), use a single-click to open Desktop items, and add active content (such as a stock ticker) to the Desktop. If you decide to try the Active Desktop approach, you can return to this tab of the Display Properties dialog box to manage your active Desktop items, add new ones, delete old ones, or change settings.

Set display settings. If you're not satisfied with your monitor's current color or screen area settings, try the Settings tab of the Display Properties dialog box. (Right-click the Desktop and choose Properties to open the dialog box.) Use the drop-down menu to pick another color setting, such as True Color, High Color, or 256 Colors. Adjust the screen area by using the slider to choose 640 x 480, 800 x 600, or 1,024 x 768. Remember that the higher number of pixels you choose, the more information you can display on-screen.

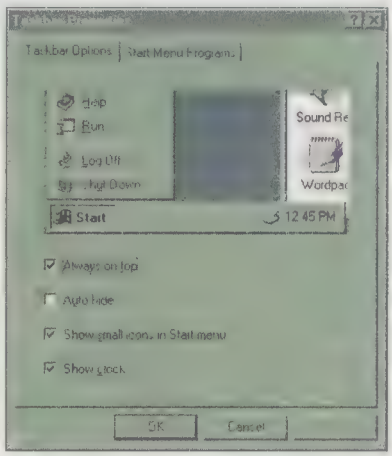
Customize folder options. Win98 offers several options for customizing the way in which many of your folders behave and respond. Go to the Start menu, choose Settings, Folder Options to open the Folder Options dialog box. Or, from Windows Explorer (where you most frequently manage folders), go to the View menu and choose Folder Options.

Under the General tab in the dialog box, the first folder option is Web Style, in which the folders and Desktop look and act like the Web. For example, one click opens an item, and pointing to it selects it. In the Classic Style, folders and the Desktop look and act as they did in previous versions of Windows, where a single click selects an item and a double-click opens it. Or, select Custom, then click Settings to specify your own preferences for clicking, viewing Web content, browsing folders, and enabling an active Desktop item.

Customize the mouse. Win98 lets you configure several mouse properties from within the Mouse Properties dialog box. From the Start menu, choose Settings, Control Panel, and then Mouse. In this dialog box, you can adjust the double-click speed, the function of the mouse buttons, acceleration and speed, pointer trail, and other such features.

Customize the keyboard. As with the mouse functions, you can easily set preferences so that the keyboard responds the way you like. Choose Settings, then Control Panel from the Start menu, and then double-click Keyboard to open the Keyboard Properties dialog box. Within this box, you can control the character repeat delay and repeat rate as well as the rate at which the cursor blinks.

Assign sounds to events. Make the hours spent in front of your computer a little less mundane by customizing the sounds Windows makes for different events, such as closing a program, exiting Windows, or receiving new mail. Go to the Start menu, choose Settings, Control Panel, and then Sounds. In the Sounds Properties dialog box, select a particular event, and then use the Name drop-down menu to choose the sound you want associated with it. Click the Preview button to hear the sound. You may use the Windows default sound scheme or you can opt for one with more character, such as the Jungle Sound scheme or a custom scheme of your own creation.



The Taskbar Properties dialog box houses several customizable options for your Taskbar and Start menu.

Organize the Desktop. Windows is always ready to lend a hand when it comes to organization. Right-click the Desktop and choose Arrange Icons. You may then specify whether you want your Desktop icon shortcuts arranged in order by name, type, size, or date.

Add Taskbar toolbars. The Win98 Taskbar has an amazing capacity for toolbars. Determine which toolbars appear on the Taskbar by right-clicking a blank spot on the Taskbar and choosing Toolbars. The Links toolbar adds the contents of Internet Explorer's Links bar to the Taskbar. The Address toolbar places your

browser's address bar on the Taskbar, enabling you to open Web sites from the Taskbar.

Choosing BatteryScope or PowerPanel places information about your battery or shortcuts for Idle, Suspend, Hibernate, and Video Off modes on your Taskbar. The Desktop option puts your Desktop shortcuts in toolbar button form on the Taskbar, and the Quick Launch toolbar places your open applications as buttons on the toolbar so you can conveniently navigate between them.

Finally, choosing New Toolbar lets you specify any folder or Internet address you want to incorporate as a Taskbar toolbar.

Rearrange and resize Taskbar toolbars. With multiple toolbars residing on the Taskbar, you might decide that you could be more productive if they were arranged in a slightly different order. To move a toolbar, simply click the short vertical bar at the left end of the toolbar and drag it to the desired position. Similarly, you may prefer certain toolbars to be larger or smaller than other toolbars. Grab those same vertical bars with your pointer and use the click-and-drag method to shrink or expand a toolbar.

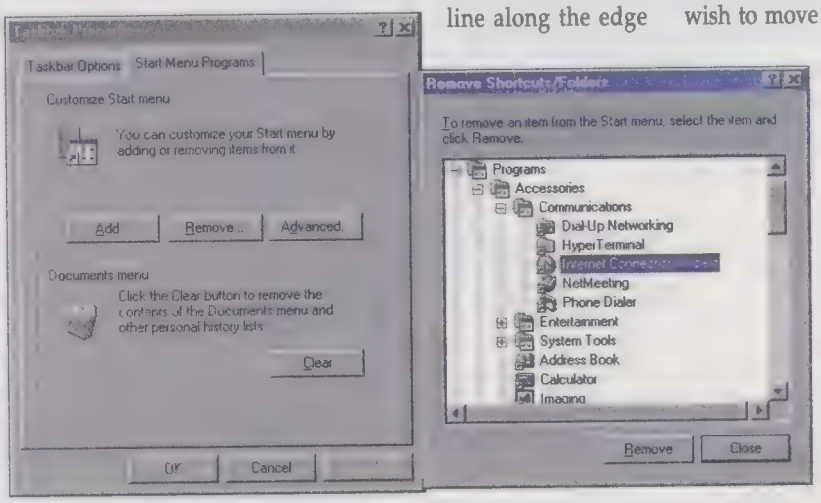
Cascade windows. Right-click the Taskbar and choose Cascade Windows if you want to organize all your open windows in a cascading, slightly overlapping fashion across the Desktop. This enables you to have multiple windows open and be able to easily access any one of them by clicking the title bar. Choose Undo Cascade if you decide you don't like the formation after all.

Tile windows. Use the Tile Windows Horizontally or Tile Windows Vertically commands (by right-clicking the Taskbar to open the menu) to view all your open windows simultaneously by shrinking and stretching them to fit either horizontally or vertically tiled across your screen. Remember that tiling works best when you have only two to four open windows. Tiling any more windows than that makes the screen appear cluttered and results in windows that are really too small to work within. Choose Undo Tile when you tire of the arrangement.

Minimize all windows. Right-click the Taskbar and choose Minimize All Windows for a fast way to minimize all your open windows down to Taskbar buttons. You can accomplish the same thing by clicking the Minimize button in the upper-right corner of each window, but if you have several windows open and want to minimize all of them, this is a welcome shortcut. Select Undo Minimize All to resurrect the windows back to the way they were.

Taskbar options. When you right-click the Taskbar and choose Properties, the Taskbar Properties dialog box opens. The first tab, Taskbar Options, lets you make choices about the way the Taskbar behaves. If you choose Always On Top, the Taskbar remains visible, even when other applications are maximized.

The Auto Hide feature dissolves the Taskbar into a thin line along the edge of the screen. It reappears only when you move the pointer over it. Select Show Small Icons In Start Menu to shrink the icons in the Start menu so they occupy considerably less space. Finally, select or deselect Show Clock to either show or hide the clock in the right corner of the Taskbar.



To remove items from the Start menu, use the options under the Start Menu Programs tab in the Taskbar Properties dialog box.

Start menu customization. Start Menu Programs is the second and final tab in the Taskbar Properties dialog box. (Right-click the Taskbar and choose Properties to open the dialog box.) Under this tab, you can customize the Start menu by adding or removing items from it. Use the Clear button to empty the contents of the Documents menu and other personal history lists. (Choose Start, Documents to view the Documents menu.)

Move the Taskbar. Click any empty portion of the Taskbar and drag to relocate it. The Taskbar typically resides along the bottom of the screen, but there's no reason it can't sit on either the left, right, or top edges of the screen. Simply click and drag it to the position you want.

Resize the Taskbar. If you've added a few too many toolbars to the Taskbar, you can buy yourself a little more space by resizing it. Place your pointer over the top edge of the Taskbar until the large arrow turns into a double-sided arrow. Click and drag it upward to stretch the Taskbar to twice its original size.

Rearrange Start menu items. Not only can you add and remove items from the Start menu, but you can also rearrange the items within it, shuffling them around to best suit your productivity needs. Click the program or folder you wish to move and then drag it to the desired location. As you drag, a black horizontal bar appears. When the bar is where you want to place the menu item, simply release the mouse button to drop the item there. The only Start menu items you cannot rearrange are the standard ones such as Programs, Favorites, Documents, Settings, Find, Help, and Run.

Customize folder viewing. When you are in either My Computer or Windows Explorer, you may wish to customize the style and order in which your folders and their contents appear. From either location, go to the View menu. Here, you'll find the option to view items with large icons or small icons, depending on the amount of space you have available. Alternately, you can view them in list form or with details, such as the size, type, and date last modified. Additionally, you may choose to arrange icons in order of name, date, size, or type. (In My Computer, you can arrange them in order of free space or drive letter, too.)

Once you have Win98 customized the way you like it, you'll feel more at home in front of your computer and probably also be more productive. LS

by Hannah Henry

Change The Win98 Registry

Understanding & Using The Power Behind Its Structure

If the Registry is your focal point, then sit down, fire up your Windows 98 machine, and get ready to dig in and check out the inner workings of the Win98 Registry. It is said that people learn best by doing, so follow along with your Win98 computer beside you. This article provides a short tour for making Win98 Registry changes, taking you through each of them step by step. A good way to take this tour is to read the entire article, then follow our examples the second time through.

Before making any changes to the Win98 Registry, one should understand what the Registry is, how it is structured, what it contains, and why you might want to change it. See the article, "The Windows Registry," earlier in this issue for a complete discussion and the essential background information you'll need. After reading it, you should have a good foundation for exploring and changing your Win98 Registry.

Any article on the Windows Registry should include a warning, and this one is no exception. So, before making any Registry changes, you need to understand that the Registry is a critical component to the successful operation of Win98. If the Registry becomes corrupted, Win98 or your applications can become unstable and might fail to start properly. Therefore, make sure your system, data, and Registry are backed up before attempting to make any changes.

With that in mind, let's now make sure everyone understands the concepts of keys and values, both of which are central to the Registry's operation. **Keys** are containers for values and other keys, whereas **values** are containers for data. The data contained by a value is a string of characters, a number, or a binary value. Again, refer to the article, "The Windows Registry," for a more in-depth discussion.

The Registry Editor. The most common way to change the Registry is with a tool called the Registry Editor. This program, which comes with Win98, lets you navigate through the hierarchical information stored in the Registry. You can do more than just browse, however, with the Registry Editor, you can modify a vast array of system and application configuration settings. A caveat before getting started: Any changes you make using the Registry Editor take effect immediately; there is no automatic undo feature.

The first change we will walk you through is changing the Desktop wallpaper that displays while nobody is logged into the system. Start by opening the Registry Editor. From the Start menu, select Run. Then, type **regedit** into the field provided next to Open and click OK. You should see the Registry Editor window display on-screen.

The Registry Editor displays two panes, one on the left representing the hierarchy of keys in the Registry and one on the right representing the values that are contained by the currently selected key. The familiar folder icon is associated with each key. Keys that contain other keys have a small square beside them with a plus sign (+) inside. Click one to expand the current key and see the other keys it contains.

The hierarchical relationships shown in the left pane mirror the actual structure of the Registry. In text, this relationship is frequently depicted as a list of key names with separators, for instance: HKEY_USERS\.DEFAULT\CONTROL PANEL\DESKTOP. This implies that the DESKTOP key is contained by the CONTROL PANEL key, which is in turn contained by the key labeled as .DEFAULT. Finally, the key containing .DEFAULT is HKEY_USERS. Making any changes to the Registry involves navigating through this hierarchy to the desired key and then adding a value or changing an already existing value.

Key Points

- The Registry Editor is a standard Win98 program you can use to make changes to the system Registry.
- When making changes to the Registry, keep in mind there is no automatic undo feature. To protect yourself, make sure you back up your system, data, and the Registry before making any changes.
- You can use Registry scripts to store and automate Registry changes.

So, back to our example: Let's change that wallpaper. In the left pane, double-click the HKEY_USERS key or the plus sign beside it. Once its contents display, double-click the .DEFAULT key, the CONTROL PANEL key, and the DESKTOP key. So far, things inside the right pane have been pretty uneventful; but once you double-click the DESKTOP key, the story changes. You should see the right pane fill up with a list of values. The keys (shown in the left pane) are simply a hierarchical containment structure; the values (shown in the right pane) contain the actual configuration data.

Before changing the wallpaper, you should do two things. First, locate a suitable image file that you would like to display instead. The image should be in Windows Bitmap (.BMP) format. You will need the full, correct path to the image. Second, you should make note of the existing data contained by the value. In this case, it's a pair of empty quotation marks next to Wallpaper (""). This information is useful if you want to change the wallpaper back to its original setting.

Next, double-click the Wallpaper value in the right pane. This brings up a simple dialog box that lets you change the data associated with the value. Type in the full path name to the image in the field labeled as Value Data, then click OK. For example, we chose an image of a volcano, so we typed: **C:\images\nature\volcano.bmp**

Remember that the Registry Editor is not going to perform any consistency checking for you, so you should double-check your typing before clicking OK. After completing this change, the next time you log out you should see your picture of choice on-screen rather than the one some Microsoft marketing manager chose for you.

As long as we're changing default settings imposed by others, let's rename the Recycle Bin something else, such as Wasteland. You'll note that when you right-click the Recycle Bin icon on your Desktop, you don't have the option to rename it. That's when it's time to turn to the Registry Editor.

Open HKEY_CLASSES_ROOT/CLSID/{645FF040-5081-101B-9F08-00AA002F954E}. This one may take a little time to find because there are several keys inside of HKEY_CLASSES_ROOT and CLSID. You can try using the Find command in the Edit menu to search for a key containing "645FF040." Next, double-click the "(Default)" value in the right pane. Change "Recycle Bin" to "Wasteland" or whatever text you desire. Win98 doesn't update the Desktop icon immediately, but the next time you start Win98, you'll see the new value.

Registry Scripts. Registry scripts are another method you can use to make changes to your Windows Registry. To use them, you must create and execute a Registry script. Don't worry, this is even easier than it sounds.

First, here is just a bit of background information. A Registry script is simply a text file that is named with the extension .REG. Text files are commonly created by text editors such as Notepad.exe. You can even use Microsoft Word to create text files, and thus, create Registry scripts. To do this, create a new document, choose Save As from the File menu, and name the file something similar to: SetScreenSaveTimeout.reg. Be sure to end the name with the .REG extension, choose Text Only in the Save As Type drop-down menu, and click OK.

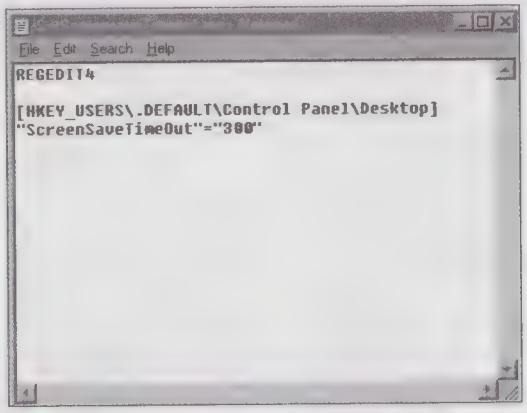


Figure 1. This example represents a simple Registry script that you can use to change the default time-out value for a screen saver on your system.

Once properly created, executing a Registry script is easy. All you have to do is double-click the file's icon from within Windows Explorer, and it automatically makes changes to your Registry.

By default, Win98 assumes that any file with a .REG extension is a Registry script.

Now, let's walk through this entire process step by step and make the concepts described above more solid. For a demonstration, we're going to change the time-out value for a screen saver to five minutes (300 seconds). Open your favorite text editor. If you don't already have one, select Run from the Start menu, type **notepad.exe** into the field provided, and click OK.

In your text editor, type **REGEDIT4** on the first line. Press ENTER a couple of times, then type **[HKEY_USERS\.DEFAULT\Control Panel\Desktop]** and press ENTER again. For the next and final line, type **"ScreenSaveTimeOut"="300"**

Yes, you must type everything in bold, including all the quotation marks. Your file should look like Figure 1 on this page. Then, simply save the file under a name similar to: SetScreenSaveTimeout.reg.

Now it's time to explain this Registry script. There are three basic parts to the .REG file. The first line identifies the rest of the contents as being a Registry script. The second line contains the familiar hierarchical key structure identifying the key that we are interested in changing. The third line indicates both the value and its associated data that we want to set in the Registry. There is more you can do with Registry scripts, but this example covers the most basic operation: changing a value in the Registry.

To execute the script, find the file from within Windows Explorer (right-click the Start button, then click Explore) and double-click its icon. You should see a message display on-screen, stating the file has been successfully entered into the Registry. You can use the Registry Editor skills described above to double-check and see that the value was actually changed.

There are several reasons why scripts are also more useful than the interactive Registry Editor is. First, if you document the change in a text file, it is easier to remember. Second, you can collect a number of changes in a script file (or several script files) and execute them all at once. This method is much quicker than manually navigating through the Registry's hierarchy, especially if there are several computers you need to change.

Exiting The Registry. Our Win98 Registry tour has now come to an end. Whether you plan to manually manipulate your Registry by using the Registry Editor or automating configuration changes to a number of Win98 computers by taking advantage of Registry scripts, a little familiarity with the Registry tools can make managing your Win98 system (or systems) much more successful. LS

by C. Reid Turner

Common Win98 Error Messages

Tips To Solve Your Windows Woes

When Windows 98 usurped Windows 95, it provided more stability and was far easier to use for both pros and newcomers. But even though the improved operating system doesn't die quite as often as its volatile counterpart does, it's not perfect. In fact, you might see enough error messages to make you vow never to touch a computer again. Bearing in mind the fact that computers are inescapable, you might as well face up to error messages. We've tried to make living with them easier by compiling a list of the most common error messages and providing help on how to overcome them.

Error Message: "MSGSRV32.EXE caused a general protection fault in module CM8330SB.DRV," "EXPLORER caused a general protection fault in module CM8330SB .DRV," "MSGSRV32.EXE: An error has occurred in your program," or "Iexplore caused a general protection fault in module cm8330.drv."

Solution: These scary-sounding error messages are related to the sound card, specifically the C-Media CMI8330 or a SoundPro model. This and most sound card problems can be resolved simply by downloading the updated driver from the manufacturer's Web site. Find updates from http://www.cmedia.com.tw or http://www.pcchips.com/driver.html and follow the directions to update your card.

Error Message: "Error starting program. There is not enough memory. Quit some programs and try again."
Solution: If you have too much memory dedicated to other tasks, you could see this message. You can solve it by either deleting unnecessary files on your hard drive to free up space, emptying your Recycle Bin by right-clicking the icon and selecting Empty Recycle Bin, or installing more RAM (random-access memory).

Error Message: "Serious Disk Error Writing Drive <X>," "Data Error Reading Drive <X>," "Error Reading Drive <X>," "I/O Error," "Seek Error - Sector not found."
Solution: If your computer has either damaged data or a damaged hard drive, you will see one of these messages. To fix it, first test the hard drive for damage by running ScanDisk. Go to the Start menu, select Programs, Accessories, System Tools, and finally ScanDisk. Choose the drive where the problem is occurring, click Thorough, and then Start. Once the damaged data has been found, either save the damaged data to a file or discard it, and the problem should be solved.

Error Message: "This program has performed an illegal operation and will be shut down."
Solution: This is one of the most vague error messages on Win98, and you'll see it every time something crashes on your computer. It's usually a one-time problem, so just let the program close and restart it. If the message continues to appear when you are using one particular program, you may have to uninstall and then reinstall that program.

Error Message: "<Filename> cannot be added because it already has a sync copy in this Briefcase."
Solution: The Briefcase can be helpful for keeping files on two or more computers in sync, but when you copy files from the Briefcase onto a diskette, they cannot be copied to a folder on the hard drive. This isn't a glitch; it's a design decision. Microsoft figures that copying this way would not ensure synchronization, so you have to live with it.

Error Message: "A filename cannot contain any of the following characters."
Solution: Win98 accepts only certain characters when naming files, so you can't name a document with something like a dollar sign. Check the accepted file naming characters here at: http://support.microsoft.com/support/serviceware/windows/win98/3ECRYHYZ.ASP.

Error Message: "An error occurred while writing the backup data. The end of the media was approached unexpectedly."
Solution: This problem occurs when you're using Microsoft Backup or DriveSpace to back up data, and there isn't enough room on the storage device, such as a Zip drive, for

Key Points

- Overcome printer spool problems by switching your printing format to RAW mode.
- The best response to the illegal operation error message is usually just to shut down your computer and restart.
- Bad disk sectors come about when your system's power is turned off before it shuts down completely. Run ScanDisk to repair errors.

everything. The trouble is that you won't know when you're out of space, and you'll just see this error message. The solution is to back up less information or buy more Zip disks.

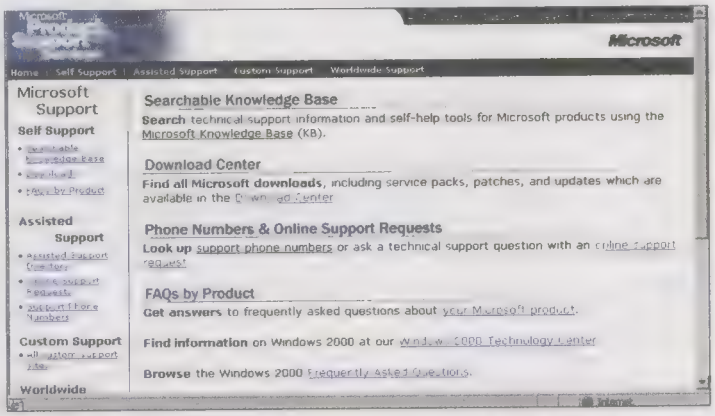
Error Message: "Invalid system disk. Replace the disk and then press any key."
Solution: You might see this when you're rebooting or setting up your computer. It appears when something is preventing your computer from booting properly, such as hard drive management software, virus protection software, or even a virus. When you're installing Win98 and you see this, you must first uninstall the software or boot the computer using the startup diskette you created at the beginning of the installation process.

Error Message: "The computer is not receiving a response from the modem. Check that the modem is plugged in, and if necessary, turn the modem off, and then turn it back on."
Solution: When starting up Dial-Up Networking, you might see this message. Often it appears when there is something wrong with your modem, so be sure it's plugged in and working properly. You might also see this message if your modem is using a newly detected serial port. In this case, you'll need to alter the properties in Dial-Up Networking to use the new modem settings. This message has also been reported by people using a 3Com USB (Universal Serial Bus) modem, in which case you can download the updated driver from the company's site: http://consumer.3com.com/voice/index.html.

Programs in the StartUp folder also might trigger the message. If this is the case, temporarily disable the programs. From the Start menu, select Run, type msconfig, and press OK. In the Msconfig box, click the Startup tab and turn off any programs there that might control your modem. If you're not sure what's controlling your modem, you can turn off everything but ScanRegistry, TaskMonitor, SystemTray, and LoadPowerProfile.

Error Message: "Commgr32 caused an invalid page fault in module Kernel32.dll," "MPREXE Not Responding," or "Mprexe caused an invalid page fault in module Kernel32.dll."
Solution: When your password list (.PWL) file is damaged, you will see this message when starting up. It's a simple one to fix. First open Find from the Start menu and locate all files with a pwl extension by typing in *.pwl. Then delete them. Restart your computer, and it will automatically re-create an error-free password list file when you log on.

Error Message: "One or more of your disk drives may have developed bad sectors. Press any key to run ScanDisk with surface analysis on these drives."
Solution: If Win98 wasn't properly shut down, for instance if the power went out or you were forced to turn off the power after a crash, you might see this message before the operating system restarts. It might also show up with a hard disk error. Whatever the cause, you can remedy it by running ScanDisk, which will repair any error and enable Windows to load properly. You'll see a prompt that says to press any key to run ScanDisk; make sure the C:\ drive is selected. Then wait while ScanDisk makes repairs.


Microsoft
Home | Self Support | Assisted Support | Custom Support | Worldwide Support
Microsoft Support
Self Support
Assisted Support
Custom Support
Worldwide
Searchable Knowledge Base
Search technical support information and self-help tools for Microsoft products using the Microsoft Knowledge Base (KB).
Download Center
Find all Microsoft downloads, including service packs, patches, and updates which are available in the Download Center
Phone Numbers & Online Support Requests
Look up support phone numbers or ask a technical support question with an online support request
FAQs by Product
Get answers to frequently asked questions about your Microsoft product.
Find information on Windows 2000 at our Windows 2000 Technology Center
Browse the Windows 2000 Frequently Asked Questions

You can find solutions to nearly anything that's ailing Win98 on the Microsoft Product Support Services Web site.

Error Message: "Setup has searched the specified directory but cannot find any qualifying products."
Solution: If you're one of the few to have kept Windows 3.0 until installing Win98, then you'll see this message. The problem is that Win3.0 is not equipped to handle the upgrade to Win98; it cannot find the tools necessary to complete the upgrade. Unfortunately, the only solution is to contact Microsoft Technical Support.

Error Message: "An error has occurred in your application. If you choose ignore you should save your work in a new file. If you choose close, your application will terminate."
Solution: When you're moving from Windows 3.x to Win98, and you've disabled virtual memory before running Setup, you'll see this message. The easy fix is to enable virtual memory before running Setup. In the Win3.x Program Manager, click Main, then Control Panel, and then 386 Enhanced. Then choose the Virtual Memory button to see its dialog box. Click Change, and in the New Swapfile Settings box, select either Temporary or Permanent from the drop-down list for Type and click OK. Now you can upgrade.

Error Message: "The Registration wizard cannot run because the information it requires from the system is either unavailable or incomplete."
Solution: You can see this message if you're trying to start the Registration Wizard from the command prompt, the Run dialog box, or by double-clicking the Regwiz.exe file in Windows Explorer. As long as you have an installed and functioning modem, you can correct this problem easily. Simply start the Registration Wizard from the Welcome To Windows 98 dialog box. From the Start menu, choose Run, and in the Open drop-down box, type **WELCOME** and **OK**. When the Welcome to Windows 98 dialog box appears, click Register Now to complete registration.

Error Message: "The wallpaper you selected can be shown on the desktop only if Active Desktop is enabled. Do you want to enable it?"
Solution: Customizing your Desktop can help make your computer seem your own, but not all wallpapers will display on it. If you see this message and you have Active Desktop disabled, make a choice if you really want the wallpaper or not, because turning on Active Desktop is the only way to use it.

Error Message: "Windows cannot create a shortcut here. Do you want the shortcut to be placed on the desktop instead?"
Solution: Win98 doesn't allow you to create shortcuts in the Dial-Up Networking dialog box or create a shortcut to a virtual folder anywhere

other than on the Desktop. If you're trying to create a shortcut to Dial-Up Networking, either create one on the Desktop or right-click the Dial-Up Networking icon and drag it to whatever folder you wish. Your only option for a virtual folder shortcut is the Desktop.

Error Message: "Winhlp32 caused an Invalid Page Fault in Module Winhlp32.exe."
Solution: You might see this error if you quit Windows Help while a Win98 Troubleshooter is being loaded. Just wait for the Troubleshooter to finish loading before exiting Windows Help.

Error Message: "TASKMON caused an invalid page fault in module Kernel32.dll."
Solution: If the log files in the Applog folder are damaged, this message appears when you shut down Win98. The Task Monitor tries to update log files each time you close, and when something is wrong with the files, it can't. To fix the problem, go to My Computer and choose the drive that holds the Windows folder, likely C:\. From the View menu, select Folder Options and choose Advanced Settings. Then, under the Hidden Files, select Show All Files. Click OK to close the box and double-click the Windows folder. Select the Applog folder and, from the File menu, choose Rename and enter a new name, such as Applog2. Press return. When you restart your computer, the Applog folder and files are recreated.

Error Message: "SPOOL32 caused a General Protection Fault in module Kernel32.dll at <address>, "SPOOL32 caused an Invalid Page Fault in module Kernel32.dll at <address>," or "SPOOL32 caused a Stack Fault in module Kernel32.dll at <address>."
Solution: The Spool32 error messages are common, and they all relate to your printer. Spool32.exe is a component that manages print jobs by first storing your documents on the hard drive and then sending them to the printer. You'll receive one of these messages if something is interrupting this process. Often an out-of-date print driver is the culprit, so you should locate and install the updated print drivers from your printer's manufacturer.

If the drivers are up to date, perform a clean-boot. Choose Programs from the Start menu, then go to Accessories, System Tools, and finally System Information. From the Tools menu on the dialog box, click System Configuration Utility. Then, under the General tab, click Selective Startup and then clear these checkboxes: Process Config.sys File, Process Autoexec.bat file, Process Winstart.bat file, Process System.ini file, Process Win.ini file, and Load Startup Group Items. Click OK, close the tool, and restart your computer. Clean-booting clears up most printing problems, such as interference from an antivirus program or other utility.

If the problem persists, however, you can change the printing format from Enhanced Metafile (EMF) to **raw** data type and bypass spooling altogether. (Raw data is data sent directly to a device without being interpreted first.) Go to Start, choose Settings, and then click Printers. Find the printer you're using, right-click its icon, and choose Properties. From the Details tab, click Spool Settings and then Print Directly To The Printer. Find the Spool Data Format box and click RAW. Click OK to finish and close the window.

As your last resort, create a workaround to get past a program that might be preventing Spool32.exe from running when Win98 starts. You can do this by simply changing a line of text in a file. First, use Find under the Start menu to find the Win.ini file and open it using a text editor, such as Notepad. Locate the Load= or Run= line in the file and type:

C:\windows\system\spool32.exe

The "C" represents the drive where Win98 is installed, and "windows" is the folder in which it's installed. LS

by Monique I. Cuvelier

When All Else Fails . . .

Looking through this article for hints on how to troubleshoot Windows 98 error messages is fine, but there is no way we can cover every problem you may encounter with your operating system. When you need more help for specific error messages, turn to these resources to solve problems.

Troubleshooting Wizards. When Microsoft released Win98, it made an effort to provide as much assistance to users as possible, and part of that effort was to beef up the help files. The Troubleshooting Wizards are one of the company's great ideas. They provide thorough and easy-to-understand guidance in helping you get out of a jam, even when you don't know what the nature of the problem is. Find them in Help or online at http://support.microsoft.com/support/tshoot/tshooterlist.asp?TPR=w98.

Online Support. Just about every error message ever generated is listed somewhere on the Microsoft Web sites. You can try TechNet (http://www.microsoft.com/technet) for some solutions and general troubleshooting advice. The Microsoft Support Services (http://support.microsoft.com/directory) provides the Knowledge Base, which contains online tech support; the download center, where you can download service packs and patches; and FAQs for Win98 and other Microsoft products.

Updated Drivers. Your problem might not even be related to Win98; it might be related to your hardware. Components such as sound cards and video cards often don't work seamlessly with the operating system, so you should download the most recent upgraded drivers. Use Windows Update, which you can find through the Start menu, to go online and automatically download the most current drivers and Win98 files. You can also contact the manufacturer of your PC to find out about the newest drivers and where to find them or contact the manufacturer of the sound card, video card, or other add-on to download upgrades.

Microsoft Technical Support. Because it's a long distance call, and you can count on holding for ages, use Microsoft Technical Support as a last resort. The tech team, which can be reached at (425) 635-7222, is available Monday through Friday 5 a.m. to 9 p.m. Pacific Standard Time and Saturdays 9 a.m. to 3 p.m., except holidays. If your meltdown occurs within the first 90 days of your first call to a support representative, you're in luck: It's free. □

Troubleshoot Win98

Tips To Keep Your OS Running Smoothly

Every OS (operating system) has problems from time to time, but if you know how to troubleshoot common problems, you can cut down on your phone calls to tech support. Read on to learn Windows 98 maintenance tips, performance tweaks, and tune-ups.

Key Points

- Prepare an emergency Startup diskette to use in the event your system won't boot.
- Start your PC in Safe Mode to troubleshoot hardware settings.
- Clean out the TEMP folder and delete fonts to free up memory and boost system performance.

Emergency Startup Disk. Create an emergency boot diskette to safeguard startup in the event your system won't start up from your hard drive. Click Start, choose Settings, and select Control Panel. Then double-click Add/Remove Programs and click the Startup Disk tab. Click the Create Disk button. Insert a blank diskette into the A: drive. Click OK. When the job completes, use the diskette to start up the computer. If it works, store it in a safe place.

Starting Up in Safe Mode. Troubleshoot computer problems in Safe Mode if Win98 doesn't launch normally after your system completes its POST (Power On Self Test; the test performed at each startup when the BIOS [Basic Input Output System] looks for and verifies memory, ports, video adapter, keyboard, disk drives, and other basic devices). You'll also want to boot in Safe Mode if your computer stalls repeatedly or if operation slows to a snail's pace for inexplicable reasons. Frequently, booting in Safe Mode and then clicking Start, Shut Down, and restarting the computer resets a video display that has an unusual or unreadable appearance.

A computer that starts up in Safe Mode doesn't run Config.sys and Autoexec.bat startup files and doesn't process the Registry. Instead, it loads only the drivers that are absolutely necessary (for instance, the mouse and keyboard) and sets the display to 680 x 480 resolution with 16 colors. Running just this bare configuration makes it easier to find problematic network or hardware settings. In addition, you can use the Windows 98 Troubleshooting located in the Win 98 Start menu under the Help option. You'll know if your computer has started up in Safe Mode because the words "Safe Mode" display in four places on the screen.

To boot Win98 in Safe Mode, press F5 at Startup. To boot to the DOS prompt in Safe Mode, press SHIFT-F5 at Startup. Alternatively, press and hold the CTRL key to access the Win98 startup menu, then select Safe Mode. You can also access the Win98 startup menu by inserting a nonbootable diskette in the diskette drive and restarting the computer. When the error message indicating a "nonsystem disk or disk error. . ." appears on-screen, remove the diskette from the disk drive, then press F8 twice. Choose Safe Mode. Alternatively, press Start, click Run, type **msconfig** in the Open field, click the Advanced button (General tab), place a check mark in Enable Startup menu, click OK twice, reboot, then choose Safe Mode.

Once in Safe Mode, remove all applications and data files from the Startup folder. Also, click Start, click run, type **Sysedit** in the Open field, then check your WIN.INI file to ensure that Load= and Run= lines are blank. Be sure to click the horizontal scroll button to scroll the WIN.INI window all the way to the right. We once encountered a Load= command followed by several spaces that effectively hid an instruction to load a virus-infected application. It was only by scrolling the window all the way to the right that the full contents of the Load= line could be seen then deleted.

After starting Win 98 in Safe Mode, the operating system saves a text file called BOOTLOG.TXT in the root directory of the startup drive (typically C:\BOOTLOG.TXT).

It can be read with any text editor. Boot to the DOS prompt using your emergency startup diskette or restart the computer with the CTRL key pressed, then choose Command Prompt Only. At the DOS prompt (:\>), type **edit bootlog.txt**, then press ENTER to open the file in the MS-DOS editor.

Scroll through BOOTLOG.TXT in search of lines indicating a load failure, for instance LoadFail = mouse.drv or LoadFail = keyboard.drv. If you find any LoadFail items, you may have to reinstall the driver for the offending device. However, not all LoadFail lines are problematic. Some appear because the necessary hardware hasn't been installed. For instance you might see a LoadFail for network drivers, ndis2sup.vxd, or for the APM (Advanced Power Management) driver, VPOWERD if your system doesn't support APM.

Selecting Step-by-Step Confirmation from the Win98 Startup menu is an invaluable troubleshooting option because it enables you to confirm each command in the Config.sys, Autoexec.bat, and IO.sys files. After executing a command, watch your screen display for error messages that might indicate a problematic device or command line.

Troubleshooting hardware configurations. To find out which installed device is causing Win98 problems, right-click My Computer, click Properties, and then click the Device Manager tab. An exclamation point in a yellow circle next to any entry could indicate a hardware conflict. To fix the problem, select the offending device, then click Properties. The General tab of the System Properties dialog box provides information about devices configured to use the same resources. You may be able to click the dialog box's Resources tab and modify settings to eliminate this conflict. No two devices should have identical IRQ (interrupt request line) or DMA (direct memory access) settings. Click OK. Restart the computer. If Windows places an exclamation point next to a device that was not enabled in the computer BIOS, restart the computer, then press the appropriate key to enter the Setup menu. Enable the device. Restart the computer. Alternatively, contact your computer manufacturer for an updated BIOS.

System Configuration Utility (SCU). SCU (msconfig.exe) is a convenient Win98 troubleshooting tool that lets you modify your system configuration by turning options on or off. You can also use SCU to create a backup copy of system files before making any changes. Launch SCU by clicking Start, Programs, Accessories, System Tools, System Information. Select System Configuration Utility from the Tools menu. Alternatively, click Start, Run and type **msconfig** in the Open field.

To back up important System files, click the General tab, click Create Backup, then click OK. Follow on-screen prompts. To disable items that Win98 loads at startup, click the Startup tab, then clear the checkbox of any item that you don't want to start up. Click OK. Restart your PC. Win98 places a Disabled Startup Items in the Programs list, indicating which items it didn't run at startup.

Troubleshoot computer problems in Safe Mode if Win98 doesn't launch normally at startup.

System File Checker (SFC). Use this applet to scan and verify the integrity of your computer's system files. You can configure it to replace damaged or corrupt files with a file version that works. Launch SFC by clicking Start, Programs, Accessories, System Tools, System Information. Select System File Checker from the Tools menu. Alternatively, click Start, Run, then type **SFC** in the Open field. Select Scan for altered files, then click Start. If SFC detects a damaged file, it will present you with additional options. Otherwise, it pops up a Finished dialog box. Click Details to view System File Checker Results, which will give you information about the number of files and folders examined and the files added to the verification data file saved in C:\WINDOWS\Default.sfc.

SFC comes with a file extraction utility, making it easy for you to extract a working version of the damaged file from Win98 CAB files (Cabinet files). Click the radio button to the left of "Extract one file from installation disk," then enter the name of the file you wish to extract. In the Restore From box, verify the replacement file's source and destination locations. When Win98 inquires if you want to back up the current file. Select Yes, just in case the new file doesn't work as expected. SFC stores the backup in C:\WINDOWS\Helpdesk\SFC unless you click the Settings button, then click Change and specify another location. Follow on-screen directions to back up the file, then continue with extraction. A successful replacement message should display if all activities complete without mishap.

Add RAM. Your Win98 system may have a fast CPU (central processing unit), but performance suffers if it lacks sufficient RAM (random-access memory). RAM stores actively running applications and their data. The more installed RAM (up to the maximum permitted), the faster the CPU can process instructions. Don't confuse RAM, which is typically measured in kilobytes (KB) or megabytes (MB), with hard drive capacity, measured in thousands of MB or gigabytes (GB). Your hard drive stores inactive applications and data.

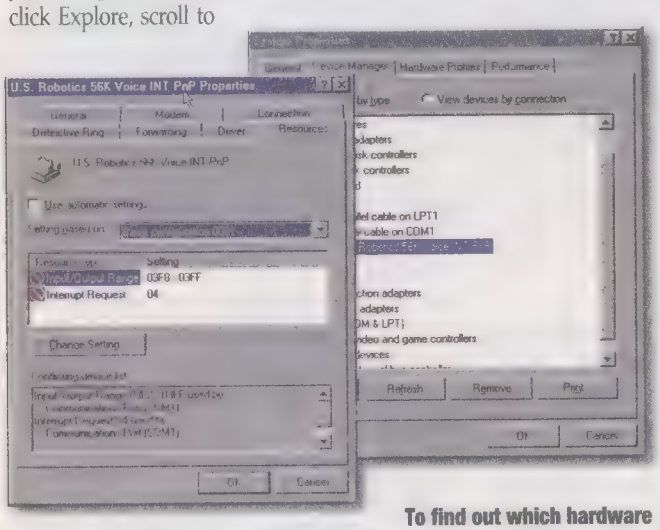
Installed RAM not only affects operating system performance, but it also determines how many applications a system can run at one time. It also determines the size of the largest data file. Feature-rich, graphics, or color-intensive programs such as Netscape Communicator (http://home.netscape.com), Internet Explorer (http://www.microsoft.com), Adobe Photoshop (http://www.adobe.com), Adobe Illustrator (http://www.adobe.com), and Macromedia Freehand (http://www.macromedia.com) all require more RAM than text-based applications.

According to Microsoft, it takes 16MB of RAM to run Win98 and 24MB of RAM to run Win98 SE. However, operation is sluggish with this bare minimum because the CPU must constantly move inactive contents in and out of RAM to make room for requested applications, instructions, and data. Whatever Win98 can't find in RAM, it retrieves from the hard drive. To optimize performance, run Win98 with at least 32MB of RAM; 64 or 128MB are recommended.

Prevent Win98 Logon Prompt at Startup. If you compute in an environment that doesn't require password protection, speed up startup by preventing Win98 from

asking for a password at Logon. Right-click Network Neighborhood, then click Properties. Click the Configuration tab, select Windows Logon from the Primary Network Logon tab, and click OK. Do not restart the computer. Click Start, Settings, Control Panel, and double-click Passwords. Click the Change Passwords tab, click the Change Windows Password button, and click OK. The Change Windows Password dialog box appears. Enter your current password in the Old Password field. Leave New password and Confirm New password fields blank. Click OK. Click the User Profiles tab under Password properties. Select "All users of this computer use the same preferences and desktop settings." Click OK. Shut down the computer, then restart it. Now the Logon prompt won't appear.

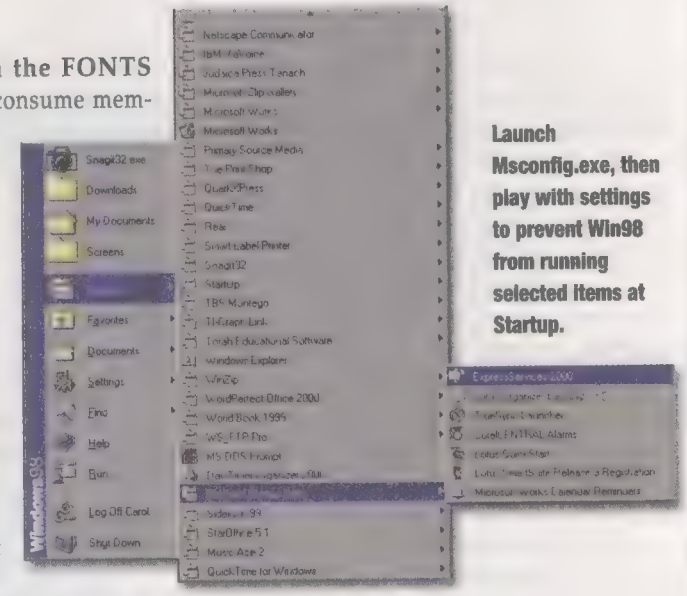
Clean Out the Temp File. Occasionally, when you install new software or you work with an installed application, Windows (or the target application) stores temporary files in the Windows TEMP folder (typically located at C:\WINDOWS\TEMP). Files in the TEMP folder consume valuable hard drive space and can sometimes prevent Windows from loading. To improve performance, delete temporary files your computer no longer uses. Right-click Start, click Explore, scroll to C:\WINDOWS\TEMP, double-click the folder, and select Details from the View menu. Click the Modified column to sort by date. If a file hasn't been modified for 7-14 days, it's probably safe to delete. Select files to delete, then right-click a selected file. Click Delete. If one of the selected files is an application, Windows will ask you to Confirm your file delete request. Click Yes.



To find out which hardware device is malfunctioning, right-click My Computer, click Properties, and then click the Device Manager tab.

Remove Fonts from the FONTS Folder. Installed fonts consume memory whether you use them or not. The more fonts installed in the WINDOWS \FONTS folder, the longer it takes Win98 to start up. Delete typefaces you don't use or move them to a location other than the FONTS folder until you need them. To delete or move fonts, click Start, Settings, Control Panel, then double-click Fonts. The FONTS folder will open. It's best not to have more than 500 installed typefaces. To delete a font, right-click to select it, then click Delete on the context menu. To delete several fonts simultaneously, press and hold CTRL and click each font you want to remove, then right-click one of the selected fonts. Click Delete.

To move selected fonts instead of deleting them, right-click a blank area of the desktop, point at New, and click Folder. Name this folder MY FONTS. Click Start, Settings, Control Panel, and then double-click Fonts. Press and hold the CTRL key as you select Fonts you want to move. Shrink the Fonts Window until you see both the MY FONTS and FONTS folders. Right-click a selected font in the FONTS folder to drag them all to MY FONTS. Select Move Here from the Context menu.



Launch Msconfig.exe, then play with settings to prevent Win98 from running selected items at Startup.

Quick Launch Toolbar. Remove clutter from the Windows Desktop. Store shortcuts to frequently used programs in the Quick Launch area of the Win98 Taskbar. To view this area, right-click an empty spot on the Taskbar, point at Toolbars, and click Quick Launch to select it. Drag an item (e.g., an application shortcut or a data file created by an application) from the Desktop into this area. A shortcut appears. You can also right-click Start, click Explore, click a Folder icon (left window), then click and drag an item from the right Explorer window into the Taskbar's Quick Launch area. To delete an item from the Quick Launch area, right-click the item, then click Delete on the Context menu.

Customizing the Taskbar. Users can customize the Windows 98 Taskbar by adding toolbars consisting of programs, files, folders, and frequently accessed Web addresses. Win98 has four default toolbars: Quick Launch, Address, Links, and Desktop. To view Taskbar toolbars, right-click a blank area on the Taskbar, point at Toolbars, and then click a toolbar option. To create a new toolbar and add it to the Taskbar, right-click a blank toolbar area, point at Toolbars, then click New toolbar. For a toolbar with shortcuts to your favorite programs or files, create a folder on your hard drive containing all the desired shortcuts, then turn this folder into a toolbar by dragging it to the Taskbar. To delete a user-created toolbar, right-click the toolbar name, choose Close from the pop-up menu, and click OK.

Tune-Ups, Patches & Updates.

From time to time, Microsoft releases Win98 fixes, updates, and enhancements. These may improve system security, add support for new device drivers, or fix bugs. For example, download the Windows 98 Customer Service Pack for enhanced support for USB (Universal Serial Bus) connections; system fixes; and several goodies, including Windows Media Player, a VRML (Virtual Reality Modeling Language) Viewer, and Web Publishing Tools. These updates are available free from http://windowsupdate.microsoft.com (click the Product Updates link) or for $5 on a Microsoft Windows 98 Updates CD that you can order from the same site. LS

by Carol S. Holzberg, Ph.D.

Win98 Compatibility Problems & Solutions

When Hardware & Software Won't Work With Windows

Imagine buying a television that requires a different component for every channel you want to watch. Now, imagine that each channel is sold separately from competing manufacturers, works differently, *and* comes with its own set of instructions? Furthermore, what if every channel has to be connected to your TV individually, and, with every channel you install, you risk knocking a working channel off the air? Sounds ridiculous? That's *exactly* the daunting challenge facing the world's most popular operating system (OS).

Windows 98 is expected to work flawlessly with thousands of current hardware and software products, and it's expected to perform with older products and products so new, they're still on the drawing board. If it sounds like an impossible task, it is. No matter how much Microsoft engineers test Win98, it's impossible to anticipate every hardware and software permutation, especially when the bulk of products are manufactured by independent third parties.

"The truth is a lot of hardware and software either simply doesn't work with Windows 98 or once installed, causes a conflict with other components," explains David A. Karp, author of "Windows 98 Annoyances," published by O'Reilly & Associates, ($24.95, http://www.annoyances.org).

The reasons some products work with Win98, while others don't, vary. Software and hardware products developed before 1995 may not work simply because they are no longer supported by Win98. Products developed after 1995 support Plug and Play, which lets Windows recognize hardware or software components and install them automatically without user intervention. If after installing Win98, your keyboard or mouse won't work, the easiest solution, says Karp, is to buy a new one.

Key Points

- Windows 98 works flawlessly with hundreds of software programs and hardware devices, but be prepared for an occasional conflict. Anticipate and prepare for some of the problems, such as update drivers made in 1995 or before.
- Take advantage of what other users have found. Read Microsoft's Hardware Compatibility List before upgrading and check the Web sites of various device manufacturers to see if any conflicts have been found.
- Rather than fight software programs, upgrade them to Win98-compatible versions, especially antivirus programs.

Conflicts Of Interest. The bulk of Win98 compatibility problems can be traced to the installation practices invoked by most new hardware and software products. Every computer component, whether it's hardware or software, dumps certain programs, files, and/or device drivers that it needs to work on your system. These files act like universal translators letting your printer, for example, talk with your word processor. As you install more software programs and hardware components, such as scanners, fax/modems, and video cameras, on your PC, traffic jams occur as device drivers crash and freeze up. Problems occur as one set of files overwrites another, so we advise you to make a complete backup before you install new components and only install one component at a time.

These conflicts or compatibility problems can be as simple as a lost toolbar or as serious as Win98 refusing to start.

One reason conflicts occur is that many manufacturers test their products in a vacuum. Product A works swell when it's the only product loaded on Win98. Unfortunately, as soon as other components are added, problems break out. Many AOL (America Online) subscribers discovered that after installing version 5.0, Win98 wouldn't start. The only way to correct the problem was to restore the drive contents from a full backup. Users who didn't have a full backup were forced to reformat their hard drives. Oops!

When confronted, software publishers and hardware manufacturers say it's impossible to code a bug-free product. There are so many computer products that testing every one under all possible conditions is unrealistic. In all fairness, they're correct. Still, there's no excuse, says Karp, for the way companies act when there is a problem. It's like asking a group of six-year-olds who spilled the milk. Be prepared to hear, "He did it!" as Manufacturer A says the fault lies with Manufacturer B or, if that fails, everyone points the finger at Microsoft.

Karp estimates most compatibility problems are caused by honest mistakes and sloppy programming. However, there are conflicts caused intentionally, when one software program deliberately sabotages another. For example,

installing Microsoft's Internet Explorer or Netscape Navigator knocks the other out of default browser status. If you're using Microsoft's Media Player to listen to audio files on the Web, installing RealPlayer or WinApp, disables Media Player. What's so sneaky is that these programs never ask permission. File associations are simply overwritten, which means when you want to play a movie on the Web, listen to a sound file, or open a Web page, chances are you'll do it with the program you've last installed, regardless of whether it's the program you're expecting to see.

Compatibility Problems.

Here are some common Win98 conflicts.

Antivirus software. Existing antivirus software on Win98 detects viruses but may not eliminate them. Update antivirus software with a version designed to run on Win 98.

Control Panel hang-ups. If Add New Hardware in Control Panel locks up, chances are Win98 is incompatible with your motherboard. You'll need to upgrade the BIOS. Contact the manufacturer of your motherboard for more information.

IBM ThinkPad models. Microsoft and IBM are working to fix problems with the 750 series. A new BIOS from IBM Bulletin Board solves some known problems with Power Management. Win98 compatibility problems with the ThinkPad Dock II can cause your computer to freeze repeatedly.

Micron P90/100. Before installing Win98, make sure the BIOS is N15 or later. Contact Micron Technologies (http://www.micron.com).

PC Card modems. When the PC Card Power Management is enabled in Win98, some PC Card modems need an extra delay. The delay causes some modems to work erratically. Follow the six steps at http://support.micro soft.com/support/windows/readme/98/hardware.asp?LNG=ENG&SA =A#modems).

Quicken. If Quicken is configured to use a printer other than the default or to use custom fonts, you may lose these settings after upgrading to Win98. After installing Win98, open Quicken and restore these settings.

Toshiba computers. Make sure you have the latest BIOS: version 5.0. Contact Toshiba at http://www.toshiba.com or call (800) 457-7777.

Winbook XP. Win98 can cause problems with the keyboard. Try disabling Win98's Power Status Polling. Open Control Panel, double-click System, click Device Manager, click the plus (+) sign next to System Class, click Advanced Power Management Support, click Settings, check the box next to Disable Power Status Polling, and click OK to save changes.

Resolving These Issues.

The best way to resolve most conflicts with Win98 is to catch them before they occur, and the onus is on the end-user. Before installing Win98, visit manufacturers' Web sites and look for updated drivers, patches, and fixes for every hardware and software program you're using.

Also, don't think you can slap any version of Win98 on your PC. Companies, such as Dell, Gateway, and Compaq, offer customized versions of Win98 on their computers; installing anything else could cause problems. Check with your hardware manufacturer before installing a new OS. In fact, even if you are using a Start-up diskette created with a previous version of Windows, you may run into problems in Win98.

If a product doesn't work with Win98 or causes a conflict with another product, and you can't find a solution on any manufacturer's Web site, Karp says you should use a search engine, such as AltaVista (http://www.altavista.com), to track down a solution. The trick is to type a specific search, such as **Iomega Zip** or **Logitech cordless mouse** and **conflict, problem,** or **troubleshoot.** Chances are you'll find a discussion forum with a solution to your problem.

Check Microsoft's Windows Hardware Compatibility List (http://www.microsoft.com/hcl/default.asp). To speak to a Microsoft Win98 Product Support professional call (425) 635-7222 or the Paid Personal Support for $35 at (800) 936-5700. If you still can't get your hardware or software to work, Karp says to stop fighting and simply switch to a competitor's products. LS

by Michael Cahlin

Microsoft Web Resources

Windows 98 Programs.txt File
(http://support.microsoft.com/support/windows/readme/98/programstxt.asp?LNG=EN) provides a list of workarounds and solutions for MS-DOS and Windows programs, third-party memory managers, and software utilities.

Windows 98 Hardware.txt File
(http://support.microsoft.com/support/windows/readme/98/hardware.asp?LNG=ENG&SA=A) supplies a list of incompatibility problems and some solutions for hardware components including: scanners, video capture devices, modems, tape drives, Zip disks, ISDN drivers and USB devices.

Microsoft's Knowledge Base
(http://search.support.microsoft.com/kb/c.asp) lets you search for technical support information and self-help tools.

USB (Universal Serial Bus) Devices May Not Work in Safe Mode
(http://support.microsoft.com/support/kb/articles/Q195/2/41.ASP?LNG=ENG&SA=ALLKB&FR=0) discusses problems with using a USB keyboard or mouse when your system BIOS doesn't support USB devices. Solution: download an updated BIOS from the manufacturer. If one does not exist, your only alternative is to use a standard keyboard or mouse instead of a USB keyboard or mouse

Problems With Real-Mode Keyboard Driver And International Code Page
(http://support.microsoft.com/support/kb/articles/Q214/4/08.ASP?LNG=ENG&SA=ALLKB&FR=0) include programs that do not detect extended character keystrokes, such as the INSERT, DELETE, HOME, etc. This problem was corrected in Win98 Second Edition.

USB Keyboard Or Mouse Does Not Work In Windows 98
(http://support.microsoft.com/support/kb/articles/Q206/0/02.ASP?LNG=ENG&SA=ALLKB&FR=0) fixes the following error messages: Windows Did Not Detect A Mouse Attached To The Computer; You Can Safely Attach A Serial Mouse Now; and To Attach A Mouse To A PS/2 Port, You Must First Turn The Computer Off. Includes instructions for installing a PS/2 or Serial Mouse or Pointing Device.

PS/2 Mouse Does Not Work After Upgrading To Windows 98
(http://support.microsoft.com/support/kb/articles/Q206/0/34.ASP?LNG=ENG&SA=ALLKB&FR=0) resolves conflicts with PS/2 mouse and shows solutions for discovering a blank mouse entry in Win98's Device Manager.

Win98 Updates & Patches

Downloads Help This OS Stay Up To Date

It's easy to find updates and patches for Windows 98, maybe even too easy. Microsoft has released quite a few patches for this operating system, as well as a second edition.

That doesn't necessarily make Win98 a bad operating system to use now; it just means that many glitches were found after its release. At the Microsoft site (http://www.microsoft.com), there are at least four pages of patches that can be downloaded individually, but the simplest solution for most users is to download either the Win98 Customer Service Pack, which bundles the most critical updates into one manageable package, or to upgrade to Win98 Second Edition (SE), which includes all updates to Win98 as well as some new features.

By the way, if you thought installing the year 2000 updates left you with an up-to-date version of Win98, think again; that patch only fixed errors related to the date change. Though it may be Y2K compliant, Win98 is still vulnerable to malicious attacks and still has enough idiosyncrasies to merit a few patches.

You can get the latest updates by clicking the Windows Start menu and then clicking the Windows Update icon near the top of the Start menu. If there is no icon, click Start, Settings, and Windows Update. That should take you immediately to Microsoft's Windows Update Web page (http://windowsupdate.microsoft.com). If for some reason you have trouble with the Windows Update feature you can go directly to the Update page by typing **http://www.microsoft.com/windows98/downloads** in your browser.

The Microsoft Windows Update site is the first place to check for updates. It offers service packs, updates, system files, device drivers, and security updates. To see exactly what's available, click the Product Updates link. The site will detect which updates are already installed on your PC and will then return a list of available updates. The list will be divided into Critical Updates; Picks Of The Month; Recommended Updates; Additional Windows Updates (which includes Multimedia, International Language Support, and Fun And Games sections, among others); and Device Drivers.

Each update is followed by information on the probable download time and a description of the update's purpose. If you find something you want, select the checkbox next to a particular update and click the Download tab at the top of the page.

Once you've selected a patch or patches and clicked the Download tab, you'll be taken to the Download Checklist, which consists of three steps:

1. Confirm Selections

You'll see a list of all the software components you've selected to download. Click the checkbox next to any component to deselect it if you've decided you don't want it after all.

2. View Instructions

Click this tab if you'd like to view a description of the patch or update you've chosen; instructions on downloading, using, and uninstalling it; and a statement of Microsoft's support policy.

3. Start Download/Back

Click the Start Download tab to begin downloading; click Back if you're having second thoughts.

Win98 Customer Service Pack.

Downloading updates and patches one at a time isn't your only option. You can install the Win98 Customer Service Pack, which includes the major upgrades but no new

Key Points

- It's a good idea to keep Windows 98 up to date to avoid problems before they affect your PC. After all, downloads are free.
- If you really want the latest features, including NetMeeting and the ability to have multiple users access the Internet simultaneously, it's time to upgrade to Windows 98 Second Edition (SE).

features, or you can upgrade to Windows 98 Second Edition, which includes everything in the Win98 Customer Service Pack and several new features.

The Win98 Customer Service Pack, also listed as Win98 SP1, includes 25 critical patches. Key updates in the Win98 Service Pack include:

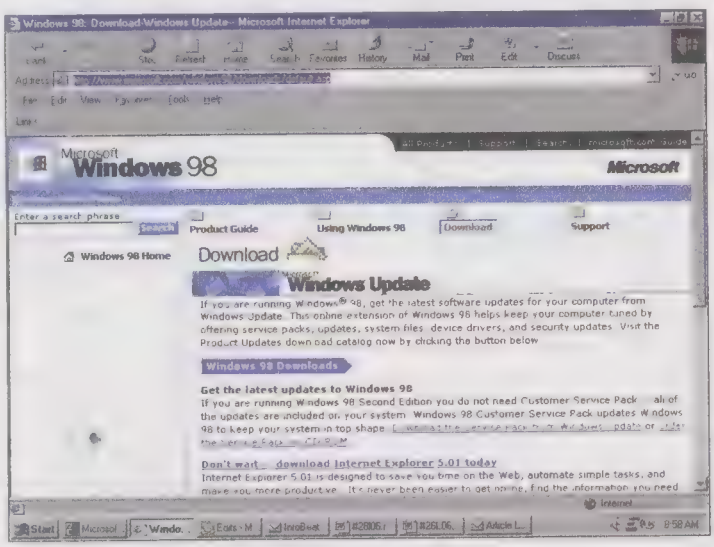
- Microsoft Virtual Machine (Microsoft VM) Patch. This update corrects a vulnerability that allowed Web operators to read files from the PC of visitors to their sites when those operators knew the exact name and location of the files. Only Java applets are affected, which means that Internet Explorer 4.x and 5.x are vulnerable. Specifically, build numbers 2000-2444, 3000-3190 and 3229-3234 are affected. To check your system's vulnerability, slick Start, Run and type **command**. Press the ENTER key. At the command prompt, type **JVIEW** and press ENTER. The version information will appear on the top line and look like this: 5.00.xxxx. The last four numbers are the build numbers.
- Image Source Redirect Vulnerability. This Internet Explorer patch is similar to the virtual machine patch and prevents Web operators from reading files on the computers of visitors to their Web sites.
- Internet Explorer Schannel.dll Update. Designed for Internet Explorer 5.01, this patch fixes an internal key in the Schannel.dll file that causes the Secure Sockets Layer or the Security Support Provider Interface to cease functioning. If you have 128-bit encryption, however, this fix is unnecessary.
- Windows 98 Year 2000 Upgrade and Update 2. The Windows 98 Year 2000 update corrects errors regarding date generation, including leap year calculations and date/time settings. The Year 2000 Update 2 includes some fixes not found on the Year 2000 Update 1. It includes routines for interpreting two-digit years and provides a way to create unambiguous dates. It also resolves two-digit date issues within DOS Xcopy and the MQRT.dll message queue, which otherwise has difficulty creating authentication certificates on February 29.

An alternative to downloading the Customer Service Pack is to click the hyperlink Windows 98 Updates for Corporate IT Managers on the Downloads page (http://www.microsoft.com/windows98/downloads/default.asp). That option is recommended for systems administrators and advanced users who are comfortable working with system registry files. The corporate site includes many, but not all, of the updates on the Update page. This section lets you store the download on the hard drive for installation later or on other PCs. Unfortunately, it doesn't list the Win98 Service Pack. Instead, it has five pages of specific, dated updates, such as the Windows Security Update of Jan. 17, 2000 or the Malformed Telnet Argument of Sept. 9, 1999. Updates are categorized as critical, recommended, and multimedia.

Win98 SE. The simplest way to update Windows 98 is to download or order the Windows 98 Second Edition (SE) upgrade for $19.95 plus $5 shipping and handling. It includes all of the updates to Windows 98 and includes Internet Explorer 5.0, NetMeeting 3.0, and Media Player 6.1. Microsoft says Windows 98 SE's system diagnostics are easier to use and that its performance is better than Windows 98's. Win98 SE has shorter application launch times and supports a new generation of hardware and entertainment options such as DVD (digital versatile disc) and USB (Universal Serial Bus).

Launched in June 1999, by now Win98 SE also needs some patches. Only a few issues have been identified, however, so updating this edition is merely a matter of loading three patches from the Windows 98 Download site. Because the patches are mixed with Windows 98 downloads, double-check the files to ensure they say Second Edition before downloading. The three patches are:

- The Win98 SE Shutdown Supplement Patch. Win98 SE has a history of shutting down when it encounters certain hardware and software configurations. This update resolves those issues. Before downloading this patch, Microsoft recommends trying the troubleshooting steps at http://support.microsoft.com/support/kb/articles/q238/0/96.asp.
- The Win98 SE USB Patch. This patch fixes a timing-specific problem in the Universal Host Controller driver (Uhcd.sys) that prevents USB devices from working with AMD (Advanced Micro Devices) processors running at 350MHz (megahertz) or faster or with a VIA Technologies USB controller.
- 128-bit Dial-Up Networking Upgrade. This isn't vital, but security-minded users can install this upgrade to use 128-bit RSA (Rivest-Shamir-Adleman) encryption with dial-up and virtual private network connections.



Start here to download patches for Win98 if the Windows Update icon fails.

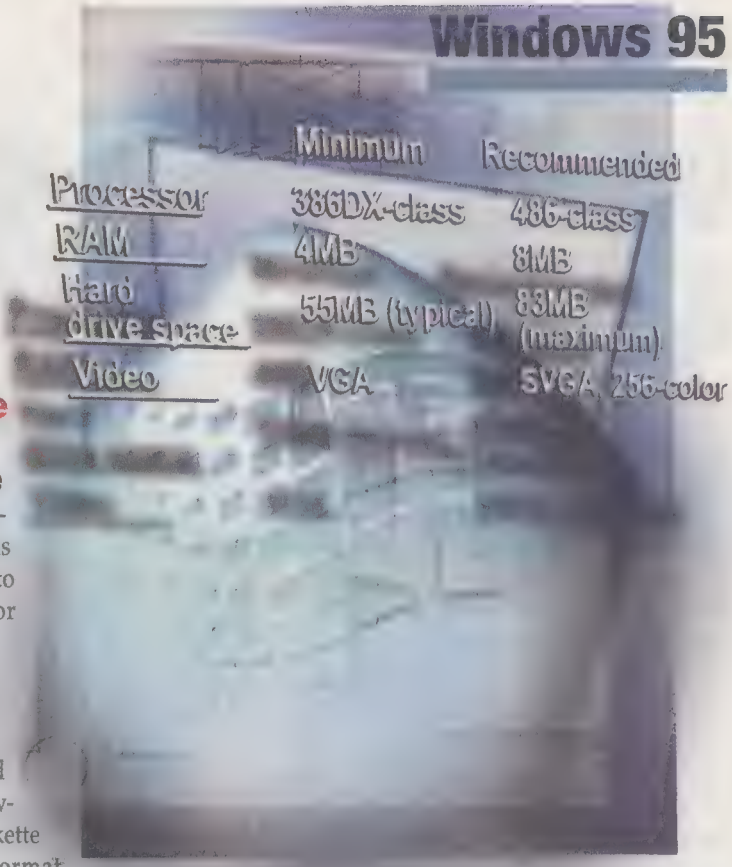
After loading the patches, the system should work smoothly. Keep in mind, however, that if you install the Win98 Customer Service Pack and later install Win98 SE, the newer version of Internet Explorer may not install. If this happens to you, get help at http://support.microsoft.com/support/kb/articles/q239/6/46.asp.

Find Your Version Number. If you're not sure whether you have Win98 SE or whether you installed Service Pack 1 for Win98, check before downloading patches. On the Desktop, right-click the My Computer icon. Select Properties. In the window that appears, look under the General tab at the System information. It will specify your edition of Windows. You should see something like Windows 98 4.10.1998 or Windows 98 Second Edition. LS

by Gail Dutton

Win95 System Requirements

Watch The RAM & Disk Drive



When Microsoft introduced the Windows 95 operating system to replace Windows 3.1 and 3.11 operating environments, it marked a watershed in the way people used PCs. Win95 has since been supplanted by Windows 98, a more powerful operating system with even more features, to the extent that you can no longer buy a new PC equipped with Win95.

Win95, however, is still a long way from extinction. Despite Win98's stranglehold on the new computer marketplace, you'll still find Win95 installed on PCs in classrooms, used-computer stores, and even many offices.

If you own a particularly old PC, consider upgrading from MS-DOS or Windows 3.x to Win95 for a couple of reasons. First, Win95 runs much of the software that runs on Win98. That means you'll be able to use many of the newest programs that you can't run on the old MS-DOS/Windows 3.x operating environment. Second, even five-year-old PC have most of the hardware needed for Win95, or you can easily upgrade them to accommodate it.

Your older PC may very well have the hardware needed to run Win98. If it does, then seriously consider making the move all the way to Win98. See the article on page 78 of this issue for details on Win98's requirements. Be warned, though, that the standard version of Win98 comes on a CD-ROM. Unless your older PC has a CD-ROM drive (or you're willing to shell out extra bucks for the diskette version of the operating system), you'll appreciate the fact that Win95 is available on diskettes.

Key Points

- You can't have too much RAM.
- All 386 processors are not equal.
- Allow space for the Y2K service patch.

Hardware Nuances. Remember some details before attempting to upgrade a PC for Win95.

First, Win95 is available on 3.5-inch high-density diskettes. Some very old computers used a low-density 3.5-inch diskette drive. If you can format your 3.5-inch diskettes to contain 1.44MB of information, then you have a high-density diskette drive.

Second, not every 386-class computer can run Win95 because not all 386 processors were made equal. After introducing the original 386DX processor, Intel introduced a cheaper, less powerful 386SX version. Although the 386SX (also known as the "crippled 386") was installed on millions of computers and was perfectly capable of running MS-DOS and Windows 3.x, the 386SX is not up to the standards needed to run Win95 or Win98. It's unlikely that you'll be able to upgrade your old 386SX processor and, even if you can, remember that you may also need to upgrade other hardware such as RAM (random-access memory) and hard drive. Consider the total cost of upgrades before making the leap.

RAM-p It Up. Win95 will run well with 8MB (megabyte) of RAM and even better with 16MB, but remember that you're going to run more than the operating system. You'll also need RAM to run programs such as Microsoft Word or Adobe PageMaker. There's no such thing as too much RAM.

When you run a particularly graphic-intensive program such as PageMaker or Adobe Illustrator, the graphics data can easily fill the RAM. When that happens, Win95 uses free space on the hard drive to create virtual RAM. It's an effective strategy that lets you run data-intensive programs, but there is one drawback: Your computer slows down every time it has to move data back and forth between RAM and virtual RAM. If you intend to run a graphics-intensive program, bulk up your RAM capacity to at least 32MB.

You'll also need more RAM than the recommended minimum for Microsoft Exchange, a program that lets you store; organize; and share e-mail, faxes, and information downloaded from the Internet. Microsoft recommends that your PC have at least 8MB of RAM to run Exchange, but that minimum doesn't begin to count the RAM you'll need for other software.

System Requirements & Y2K. Win95 arrived five years before 2000 and was not Y2K-compatible. Even after Jan. 1, 2000, this is no minor problem because it can affect searching for files and folders by date, the time and date applet, and credit card expiration dates stored in the Microsoft Wallet applet and used to make online purchases.

These potential problems mean you need a couple of more system requirements: the basic Y2K service patch available free online from Microsoft and the additional 10MB of free hard drive the patch requires. The Internet Explorer Service Pack, which fixes Internet-related Win95 problems, takes up another 80MB of space. LS

by J.W. Huttig

Win95 Secrets

Tips For The Desktop, Taskbar & More

If you're accustomed to working with an earlier version of Windows or are migrating to an IBM-compatible personal computer from an Apple, you'll discover that Windows 95 is a friendly place to do your computing work.

You can't buy a new computer these days with Win95 because every new IBM-compatible personal computer on the market is equipped with Win98 or another version of the Windows operating system, such as WinNT or Win2000. However, the way you'll use Win95 will be similar to the way you use these newer versions of Windows, to a greater extent for Win98 than for WinNT and Win2000. Moreover, you'll still find plenty of computers in offices, schools, and second-hand computer stores that use Win95. Learning to use Win95 will be good training for using PCs in general.

The most obvious improvement Win95 offers over DOS and Win3.1 is the ability to use long file names containing up to 255 characters, including spaces. The result is that you no longer have to guess about the contents of files cloaked in mysterious, short names.

Moreover, Win95 is optimized to let you run two or more programs at once and switch easily among documents and files. Win95's true multitasking capabilities mean you can print a spreadsheet, format a diskette, and type a document all at the same time.

Key Points

- The Start button takes you to programs and documents.
- The customizable Taskbar is a quick way to move among programs.
- Put shortcuts to files and programs on the Desktop for easy access.

The pictures, buttons, and on-screen mouse pointer that you see when you turn on your computer are all part of the Win95 interface, a term that describes the place where you and the computer come face-to-face. The most important parts of the interface are the horizontal Taskbar at the bottom of the computer screen, the Start button on the left end of the Taskbar, the My Computer icon, and the Desktop (everything else).

■ **Getting Started.** Click the Start button to open a list (or menu) of options. Clicking the Programs options opens a list of programs loaded onto your computer. Clicking the Documents option opens a list of recently created or modified files. Note that even though this option is called a Documents list, it also includes spreadsheets, databases, pictures, etc.

Here's what's neat about Win95's Start menu compared to the menu offered in previous versions of Windows: You can open the document and launch the program used to create it, simply by clicking its icon in the Documents list. You don't need to know what program was used to create the document and, better yet, you don't have to remember what hard drive, folder, or subfolder it was stored in.

Lost programs. From time to time, you find that a program you want to use is not available simply by clicking Start, then Programs. That's because the icons that appear on the Programs list sometimes represent a group of related programs. When an icon represents a program group, such as Accessories, it will be marked with a small arrow. Clicking the icon opens another menu that contains more icons. You will occasionally need to open several menus to launch a program.

Back to DOS. Although MS-DOS has almost disappeared from personal computers, you can still run MS-DOS and DOS programs by clicking Start, then Programs, then the MS-DOS Prompt.

A window running MS-DOS will appear on the Desktop, or the entire Desktop will be replaced by a black screen with C:\WINDOWS> appearing in white characters. You can convert the blank screen into a smaller MS-DOS window (or vice versa) by simultaneously pressing the ALT and ENTER keys.

Finding files. If you misplace a document, you can find it by clicking Start, then Find, then Files Or Folders. This opens a utility program that seeks out files stored on your

computer's hard drives, diskette drives, Zip drives, and even other computers connected to yours through a network.

If you can't find the file name, you can also search for files based on partial names or the dates on which the files were created or modified. One particularly powerful feature of the Find, Files or Folders utility is the ability to look for files based on the data they contain, including words, phrases, or names.

Taking Your Programs To Task.

Every time you start a program, a new button appears on the Taskbar to show that the program is running. When you have several programs running, a group of buttons will decorate the Taskbar. The advantage here is that you can switch among programs while running them in full-screen mode. The Taskbar makes it easier to run several programs at once and to share data between programs.

A key discovery. If you're a speedy typist, you don't want to take your hands off the keyboard to reach for a mouse and switch among programs. You can avoid this hassle. Simply press the ALT key, then TAB to move from program to program to program.

Copying and pasting between programs. The Taskbar (or the ALT-TAB key combination) makes it easy to cut information out of a document in one program and paste it into another. Simply copy a section of one document (say, a spreadsheet), switch to the other document, and paste it into the appropriate space.

The Taskbar makes it easier to run several programs at once and to share data between programs.

Taskbar hide and seek. To hide the Taskbar, position the pointer arrow over the Taskbar's top edge. (It's correctly positioned when the cursor turns into a vertical bar with arrows at both ends.) Hold down the left mouse button and drag the top edge of the Taskbar to the bottom of the screen. The bar will become a single thin line at the bottom of the screen. Restore the Taskbar by reversing the process: "grab" the taskbar with the pointer and pull it up.

Bigger Taskbar. You can enlarge the Taskbar to make the button easier to read by using the same click-and-drag method explained above.

Up, down, and sideways. To suit your personal preference, you can move the Taskbar to the left or right side of the monitor or to the top. Place the pointer on a blank spot on the Taskbar, hold down the left mouse button, and drag it to the new position. As above, you can make the Taskbar wider or narrower.

Switching folders. Whenever you open a new window or program, a new button appears on the Taskbar. You can use the Taskbar to switch among folders the same way you use it to switch among programs.

The Desktop.

At first glance, the Win95 Desktop is a pretty nondescript feature decorated with just a couple of icons. By mastering just a few tips and tricks, however, you can build it into a customized workspace to fit your personality and PC usage habits.

Start by double-clicking the My Computer icon to open a window that provides quick access to icons representing your computer's disk drives. You'll also see icons marked Control Panel and Printers. Double-click the C: Drive folder to view a list of icons representing programs, files (such as documents or spreadsheets), and folders. Now double-click the MY DOCUMENTS folder, then an icon representing a document. Just as it does when you choose the Start, Documents command, Win95 opens the document and the program used to create it. You also can use My Computer to open programs.

Take Control Of Windows

Win95 includes a variety of features to meet anyone's needs, and most of the tools are available in the Control Panel folder. You can find this folder inside the My Computer folder on your Desktop, or you can open it by clicking Start, Settings, Control Panel.

Use Control Panel's Add/Remove Programs icon to open a dialog box to install components such as TCP/IP (Transmission Control Protocol/Internet Protocol) and Dial-Up Networking software needed to access the Internet.

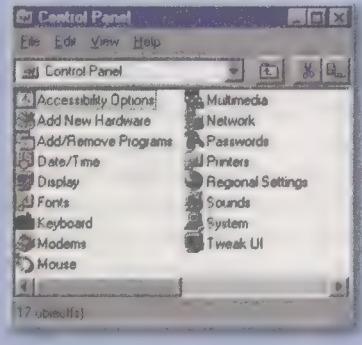
You can use other icons in the Control Panel to set up different features:

Internet—Use this to instruct your computer how to log onto the Internet.

Users—Create individualized working environments for each person who uses the computer.

Passwords—Create and manage the passwords for each person who uses the computer.

Display—Choose the background (or wallpaper) for your Desktop, select screen savers, and control the way your monitor displays fonts, colors, and images.



You'll also need to add a printer driver so your PC can send documents to your printer. But instead of using the Control Panel to install a printer driver, open the My Computer icon. Click the Printer icon, then click the Add Printer icon and follow the step-by-step directions. □

Win95 Keyboard Shortcuts

All Win95-compatible programs use these keystrokes to perform common tasks

Select All	Place the cursor in the document or data, then CTRL-A
Copy	Highlight the selected text, data, or image, then CTRL-C
Cut	Highlight the selected text, data, or image, then CTRL-X
Paste	Place the cursor in the appropriate place, then CTRL-V
Undo	CTRL-Z
Switch to Another Program	ALT-TAB

Go back to the C: Drive window and double-click the icon labeled Program Files, then, for example, Accessories, then WordPad.

Take a shortcut. Use WordPad to create a sample file, save it as My Test File in the MY DOCUMENTS folder, and exit WordPad. Switch to the MY DOCUMENTS folder, place the cursor on the My Test File icon, hold down the right mouse button, drag the icon onto the main Desktop, and release the mouse button. A pop-up list asks whether you want to move the file to the desktop, make a copy of it there, or create shortcut. Click the shortcut option, and a new icon appears with a small arrow in the corner.

The shortcut does not duplicate the file. Instead, it creates an icon that lets you access the original file regardless of where it's stored on the computer. You can make shortcuts of files, folders, and even programs.

Now delete the My Test File shortcut icon from the Desktop. Drag the icon onto the Recycle Bin icon. Win95 usually asks whether you really want to send it to the Recycle Bin. Click OK.

Switch back to the MY DOCUMENTS folder and notice that the original My Test File document is still there. Remember, you didn't delete the document itself, just the shortcut.

Back from the dead. You can retrieve a "recycled" file by opening the Recycle Bin icon, highlighting the file, and right-clicking to open a pop-up menu. Click Restore to send the icon (or file) back to its original location on the computer.

Just like your office wastebasket, though, the Windows Recycle Bin eventually needs to be emptied. Open the Recycle Bin, open the File menu, choose the Empty Recycle Bin command, then click OK. Now the space that was devoted to storing the recycled items is available to store new documents, files, and programs.

Whatizit? You can't always judge a file by its icon. To learn more about a file (or a program or folder), right-click its icon to open a pop-up list, then click Properties. The Properties box tells you what the icon represents, its full name, when it was last modified, and how big it is. If the icon is a shortcut, Properties tells you where to find the original file, folder, or program.

New views. To change the way a folder displays its contents when you're viewing it through My Computer, open the folder's View menu and choose one of these four options: Large Icons, Small Icons, List, or Details. Rearrange the icons by clicking View, then Arrange Icons to group them according to type of file (folders, documents, pictures, spreadsheets, etc.) or list them alphabetically, by the date they were most recently modified or by size.

Cleaning Up Folder Clutter. By default, Win95 creates a new window every time you open a folder. To avoid cluttering up your Desktop with windows, open the View menu when you're looking at a folder as you did in the preceding paragraph. Choose the Options command and the Folder tab and click Browse Folders Using A Single Window That Changes As You Open Each Folder.

Now when you open a folder, the contents appear in the same window. To move back to the previous folder, press the BACKSPACE key. (In Win98, use the Back, Forward, and Up buttons on the top of the window to move among different folders.)

Computer creation. To create a new folder, right-click a blank spot on the Desktop to open a pop-up menu. Click New, then Folder. When you give the folder a name, it's ready for use.

Explore Your Computer. Use the Windows Explorer feature to determine exactly how your computer organizes files and folders. Right-click the My Computer icon to open a pop-up menu and then left-click the Explore option. This command opens a window that shows exactly how your files and programs are organized.

Start Menu Shortcuts. If you don't want to place a shortcut directly on the Desktop but still want to keep it handy, you can place the shortcut in the Start menu. Right-click the icon (whether a program, folder, or file) and drag it onto the Start button.

Happy Endings. The most ironic aspect of Win95 is that you need to use the Start button to shut down your computer. Before turning off your PC, click Start, Shut Down, then click OK. Win95 shuts down all programs and takes inventory of the changes you've made to your operating environment, a process that could take several minutes.

Of course, you could save time by just turning off your PC. Unfortunately, that tends to confuse Win95 into thinking something went wrong. As a result, the next time you turn your computer on, Win95 will run a diagnostic program to see whether everything's working correctly. This process will cost you any time you saved during the shut down. LS

by J.W. Huttig

Win95 Updates & Patches

Where To Find Flaw Fixers & Performance Enhancers

This news isn't going to shock anyone, but the Windows 95 operating system wasn't perfect when Microsoft shipped it. It contained a few bugs and flaws, some of which the company and Win95 users continue to discover today.

Still, Win95 is an extremely beneficial operating system; it offered a major step up from Windows 3.x. Even though Microsoft has released newer versions of the Windows operating system, many people continue to run Win95, especially if they have an older computer that doesn't have the hardware configuration needed for Windows 98 or Windows 2000.

If you're one of these Win95 people, you don't have to install a new version of Windows to improve your operating system and fix problems. You can make the operating system run more smoothly and eliminate many of the bugs by downloading updates and patches from various Web sites, including the Microsoft Web site.

Before installing any of the updates you find, though, read the "Implementing Windows 95 Updates" article on the Microsoft Web site at http://support.microsoft.com/support/kb/articles/Q161/0/20.asp. It will even tell you where you'll find a technical support article from Microsoft that discusses downloading and using update files with Win95.

Key Points

- Patches and updates designed to fix Windows 95 flaws are easy to download from any of several Web sites.
- Microsoft continues to release Win95 patches on a regular basis as it finds new bugs.

Win95 Official Web Page. At first glance, the official Microsoft Win95 Web site at http://www.microsoft.com/windows95 may look more like a Win98 promotional site. Microsoft spends most of the space on its Win95 site attempting to convince you to upgrade to Win98.

If you have your heart set on keeping Win95, though, you'll find a few helpful software upgrades at this page, as well as some answers to Win95 questions.

Internet Explorer 5.01. When the Win95 operating system originally shipped, chances are you had an older version of Microsoft Internet Explorer. Now, you may want to upgrade to version 5.01 of this browser. The new version of Internet Explorer offers several key improvements over version 4, including 128-bit encryption, which is now required to conduct transactions on many e-commerce Web sites. Click the Download Internet Explorer 5.01 hyperlink in the middle of the Win95 page to begin the download process.

Year 2000 Update. If you've used your Win95 computer since Jan. 1, 2000, and it ran properly, you probably don't think you need this download. However, the Win95 Year 2000 update fixes minor problems such as problems with date calculations within leap years and with certain date settings that you might not discover until a few months or years after Jan. 1, 2000. Click the Windows 95 Year 2000 Update link to jump to the download page. You'll need 10MB (megabytes) of free hard drive space to install the update. (*NOTE: If you must reinstall Win95 at any time after installing the Year 2000 update, you'll have to reinstall the update.*)

DirectX 7.0. Although this update won't directly make Win95 work better, it will improve the overall performance of your system. Your multimedia and gaming software will run much more smoothly with the latest DirectX drivers from Microsoft; Win95 originally shipped with older DirectX drivers. Click the Download DirectX 7.0 hyperlink followed by the Product Updates link. Place a check mark in the DirectX checkbox by clicking it and then click Download to begin the download process.

Win95 Update. Probably the best location for finding detailed upgrades and patches for Win95 is the Win95 Update page at http://www.microsoft.com/windows95/downloads on the Microsoft site. Dozens of fixes and updates for specific Win95 problems and bugs are available for download here. The Win95 Update page is divided into various sections, including critical and recommended updates. You should visit this page several times per year because Microsoft is constantly adding updates as it and Win95 users discovers new bugs. At the time of this writing, for example, the latest update listed at the site was less than one week old.

Some of the best update files you will find in this section of the Microsoft Web site include the following:

Euro Currency Support. With this recommended download, Win95 will offer support for

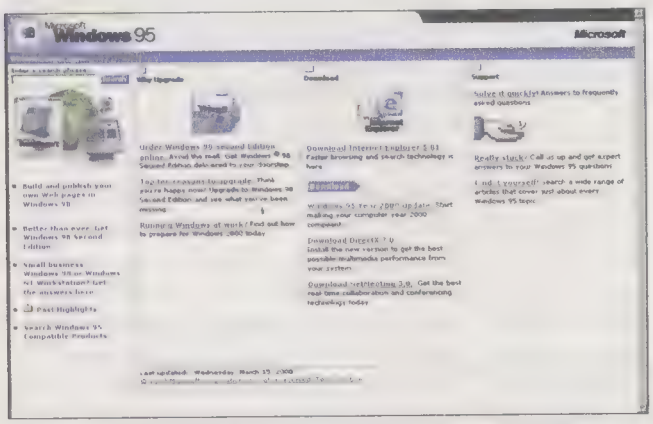
the Euro currency. You will be able to use the Euro symbol, as well as make the Euro your Win95 system's default currency.

Fragmented IGMP Packet Security Vulnerability. TCP/IP (Transmission Control Protocol/Internet Protocol) and IGMP (Internet Group Management Protocol) packets, which are used to move data between the Internet and your computer, can cause system crashes because of a Win95 bug that causes the packets to become fragmented. This critical update will fix the problem.

Internet Mail Service. This Communications area update allows Win95 users to send and receive e-mail using Win95's Microsoft Exchange. Without the update, Microsoft Exchange users will probably experience problems with lost Internet connections while attempting to send and receive e-mail messages. In addition, you could experience problems with setting the correct date stamp for sent mail. Those who need this Internet Mail Service update will probably need the Exchange Update for Windows 95, as well.

Malformed Telnet Argument. Many Win95 users probably don't use the operating system's Telnet feature anymore; the Web is far easier to use. However, if you are a Telnet user, make sure you download and install this critical update to prevent hackers from gaining control of your computer through your Telnet session. If you don't install it, you risk the possibility of having a hacker reformat your hard drive.

Service Pack 1. After releasing Win95, Microsoft offered several small upgrades to the operating system called service packs. These service packs fix several Win95 bugs. In addition, they provide new features to the operating system. Service Pack 1 is available for download at this page.



Microsoft's official Win95 Web site contains hyperlinks to a few Win95 updates, but it looks more like an advertisement for upgrading to Win98.

Backup Update. This update fixes a few bugs that shipped with the original Win95 Backup utility, which you can use to create backup copies of your hard drive. The bug, among other problems, caused an "out of memory" error when restoring data.

Fax Update. If your Win95 Fax program does not contain any default cover pages, download and install this update from the Communications section of the Microsoft Win95 Update Web page. This software makes the program's cover pages useable again.

Power Toys Set. Microsoft has developed several system enhancements for Win95 that make the operating system easier to use. Even though these enhancements are not vital to the operation of Win95, and they will not fix Win95 bugs, they are nice to have. The Power Toys update contains several of the enhancements in one file, including Tweak UI for adjusting the Win95 interface. The Kernel Toys Set update offers similar types of enhancements.

Windows Media Player. If you enjoy downloading or playing multimedia files from the Internet, you've no doubt discovered several formats for the files. Microsoft has made Windows Media Player available as a recommended download for Win95, which gives you the ability to play all types of multimedia files.

Windows security update. Microsoft has listed several security updates in recent months as critical downloads. These various security updates give Win95 protection against security holes a hacker can exploit. The updates will prevent a variety of potential problems that hackers could cause, including unauthorized use of your e-mail account, the stealing of network passwords, and malicious attempts to cause a system crash.

Other Sites. Several other Web sites contain access to a wide variety of Win95 patches designed to make the software work better. Some of the files available at these sites duplicate what is on the Microsoft World Wide Web site, but many of the files are unique to the particular Web site.

PC Win Resource Center

This Web site offers several system updates for Win95. Unfortunately, this site mixes them in with Windows NT 4.0 updates, which makes finding the updates you want a little confusing. The site offers detailed explanations of each update utility, helping you determine whether you need the patch. You'll also find shareware designed to enhance Win95 elsewhere at the PC Win Resource Center.

http://pcwin.com/software/sysutil/w32s.asp?sort=Alpha&Category=OS-Updates

Win95 Annoyances

As you might guess from its name, the Win95 Annoyances Web site doesn't sugarcoat problems you may encounter with the Win95 operating system. Not only will you find plenty of tips for dealing with Win95 but also downloadable software. Try the Collected Software and the Tech Support & Drivers links to find the best areas of the site for finding Win95 software and updates.

http://www.annoyances.org/win95

Windows 95 System Updates

This site contains an almost overwhelming number of links to various software updates that are available for Win95. If you can't find the update you want here, it probably doesn't exist. You'll also find tips for installing the updates and for determining whether you need the update. Unfortunately, the site's layout needs some help, which means finding individual update files at this site is a little difficult.

http://www.walbeehm.com/win95upd.html

WinFiles.com

WinFiles.com has several patches to fix known bugs in Win95 (and other versions of Windows). The site also contains tips for protecting your Win95 computer against attacks. Elsewhere on WinFiles.com, you'll find shareware files for Win95.

http://winfiles.cnet.com/bugs

World O' Windows

The World O' Windows site specializes in offering and finding hardware drivers to work with Win95 (as well as newer versions of Windows). You will find links to hundreds of manufacturer Web sites and to the drivers you need to make your hardware properly work. World O' Windows offers Win95 tips, as well.

http://www.worldowindows.com/win95.html

by Kyle Schurman

WinNT System Requirements

Your Knowledge Is As Critical As System Elements

Installing and running Windows NT on your desktop PC requires careful planning, especially if you intend to install it on a compressed disk drive.

Microsoft sells two basic versions of WinNT: WinNT Workstation, which is used on desktop PCs, and WinNT Server, which is used to run computer networks.

Microsoft says WinNT Workstation requires the following minimum system hardware:

Processor: 486-class processor running at 25MHz (megahertz) or faster
RAM (random-access memory): 12MB (megabytes)
Video: VGA (Video Graphics Array)
Hard Drive Space: 124MB

Beyond these minimum requirements, Microsoft recommends a more advanced hardware configuration that includes at least a 50MHz 486-class processor and 1GB (gigabyte) of available space in the hard drive partition where WinNT will be loaded.

Non-Microsoft sources stress the need for more advanced hardware to run WinNT well. Rod Cummings, a network consultant in Lincoln, Neb., recommends using at least a 133MHz Pentium-class processor and 64MB of RAM to run WinNT Workstation.

WinNT Server requires more advanced hardware because it coordinates communications among networked computers, letting them share printers and other devices. Microsoft sets the minimum system requirements for WinNT Server to include a 486-class processor and 16MB of RAM. However, Microsoft says, 32MB of RAM is "highly recommended."

Again, real-world users stress the need for more than the minimum. Cummings says typical WinNT Servers operate on a 300MHz Pentium-class processor and 128MB of RAM.

Key Points

- WinNT can't use a compressed hard drive.
- Know your system's components before starting.
- Eliminate HPFS formatting on drives.

Hardware-Intensive. WinNT is more than a souped-up version of Win95/98. Even though WinNT shares many GUI (graphical user interface) features with Win95/98, it operates quite differently beneath the surface.

WinNT communicates frequently with hardware devices such as hard drives and **video adapters** (which convert data into the images displayed on the computer monitor). Other operating systems usually don't ex-change data with hardware devices unless the operating system is sending instructions to or retrieving data from the device. As a consequence, Microsoft's WinNT Web site says, "Hardware problems that have gone unnoticed or seemed to be minor under other operating systems are likely to be amplified when running under WinNT."

That means you must know a lot about your computer's hardware. Make a list including:

- The mouse, detailing the type of mouse, the port that it uses (COM1, COM2, bus mouse, or PS/2 port), the interrupt request line (IRQ) for the input/output (I/O) port used by the mouse, the address of the I/O port, and (if it's used) the direct memory access (DMA) address of the port.
- Video hardware, including the adapter card (if the computer has a separate card) or type of chipset (if the video controller is built into the motherboard).
- The sound card's IRQ, I/O address, and DMA
- External modem port connections (COM1, COM2, etc.)
- Internal modem port connections or IRQ and, for nonstandard configurations, the I/O address
- If the computer is connected to a network, you'll need information about the network card, including the IRQ, I/O address or (if it's used) DMA.
- SCSI controller, including the adapter model or chipset, the IRQ, and the bus type.

Microsoft ships WinNT with the NTHQ software tool, which will examine your PC and make a list of the necessary data.

Storage Requirements. You may need to reformat your hard drive before loading WinNT. If you compressed your hard drive using DoubleSpace, Stacker, or other common compression software, you can't load WinNT onto the drive. It works only on uncompressed drives or drives compressed with the NTFS (WinNT file systems) included with WinNT.

Nor can you load WinNT onto drives formatted using the HPFS (High Performance File System) option available with Win95/98. You'll have to reformat the drive to a conventional MS-DOS FAT (file allocation table) or the NTFS standard.

Installing and running WinNT requires more expertise and attention to detail than the typical computer user is accustomed to. But advantages such as the ability to run advanced Visual Basic programs and SQL (Structured Query Language)-based applications and protect your data from unwelcome eyes can make the extra effort worthwhile. LS

by J.W. Huttig

WinNT Secrets

Find Tips To Help You With Everyday Tasks

To the untrained eye, Windows NT version 4.0 doesn't look so remarkable. In many ways, it appears just like Windows 95 or Windows 98. But this version of the Microsoft operating system is different. It's more rugged, it's better suited for computer administrators, and it's often the choice for networking a group of computers in a company. And while WinNT may not offer the same customization and facility of use that its brethren do, even novice computer users can customize it to suit their working habits.

WinNT has numerous tricks to help you work more efficiently. We've outlined a few here that are easy to execute, will help you navigate competently, and can facilitate finding and manipulating files and programs. Plus, we've revealed a few hidden programs that don't come with the standard installation that will help you master WinNT.

Desktop Undisclosed. Your computer's work surface is the Desktop. It's where you can present projects you're working on and easily access your favorite programs. It serves as the most accessible interface to the insides of your computer. While double-clicking My Computer to peer inside your system is fairly straightforward, some of the following tips are less obvious.

Taskbar power. The Taskbar, the bar that runs across the bottom of the screen, does more than simply let you switch between windows and delve into the Start menu. It's also the gateway to added functionality and resources. To see what we mean, hold your mouse pointer over a blank area of the Taskbar and right-click to see its pop-up menu.

Cascade Windows, Tile Windows Horizontally, and Tile Windows Vertically are all commands that help you arrange the windows on-screen with one click. Plus, Minimize All Windows is another useful command, but for the opposite effect. You'll gain the most control over the Taskbar by selecting Properties and using the options within this dialog box. Under the Taskbar Options tab, click one of the checkboxes to automatically hide the Taskbar, keep it on top, or to show or hide the system clock.

Start customizing here. The Taskbar Properties dialog box is also the place for customizing the Start menu. Click the Start Menu Programs tab and look at the available options. Under the Customize Start Menu section, you'll see options for adding shortcuts to files or deleting those you never use by clicking the Add and Remove buttons.

Even so, an easier way of putting new programs onto the Start menu is to use Windows Explorer (right-click the Start button and select Explore or Explore All Users). Just browse to the file or program you want to insert, click and drag the item from the Explorer window to the Start menu, and release the mouse button when the item is where you want it on the menu.

Clear your tracks. Now, back to the Taskbar Properties dialog box. In the bottom section under the Start Menu Programs tab, you'll see a button labeled Clear. Clicking this button removes all the contents from the Documents folder on your Start menu. Otherwise, the last 15 documents you opened are displayed when you click Documents on the Start menu.

This feature is useful when you want to look at a recently accessed document in a hurry, but at the same time, this feature also lets anyone see what you've been working on lately. If you're worried about curious coworkers, press the Clear button at the end of each workday.

Take Out The Trash. Another utility that resides on the Desktop (and one you need to control) is the Recycle Bin. The Recycle Bin is where items and files really go when you think you delete them from your hard drive. That's right; you're not really removing them from your system but merely transferring them to this big folder named Recycle Bin.

For restorations. The advantage of this arrangement is that if you get a little trigger-happy and trash a file you didn't mean to, you can safely restore it by opening the Recycle Bin, right-clicking the designated file, and clicking Restore from the pop-up menu.

Cut the safety net. If you're not worried about deleting files by mistake, however, you

Key Points

- Windows NT may not be as straightforward as Windows 98, but it is still highly customizable if you know where to look for shortcuts.
- If you frequently find yourself looking for files on a network, use the Run utility to find documents on shared computers.
- Check out one of the many extras you can download to help you gain more control of your WinNT system.

might find it a nuisance to use the Recycle Bin. If this is the case, all you have to do is hold down the SHIFT key while pressing DELETE to override the Recycle Bin safety net.

Make deletions final. Or, you can make your deletions permanent by disabling the Recycle Bin. To do this, right-click the Recycle Bin icon on your Desktop and then select Properties. Under the Global tab, choose Use One Setting For All Drives and click the checkbox that says Do Not Move Files To The Recycle Bin. On the other hand, if you want to set a delete-always standard for a certain drive and not the others, choose the Configure Drives Independently option, and repeat the process for every drive under its corresponding tab.

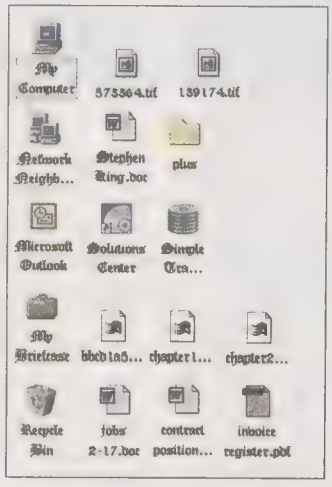
■ Changing Icons.

You don't have to settle for how the Recycle Bin or any other icon looks. You can customize anything, from size to the type of font used.

Size it up. Right-click anywhere on the Desktop and choose Properties, then select the Appearance tab. From the Item drop-down menu, choose Icon. Designate the size of the icon, its font, and the font size. Even if you don't opt for a fancy font, you might want to increase its size for easier viewing.

Improve icon display. You might notice that after using your computer for a while, your icons look a little bizarre. Maybe some of them aren't as smooth (around the edges) as they used to be, or perhaps they're appearing incorrectly somehow. The culprit behind these wacky icons might be a corrupted ShellIconCache file. This is a file that WinNT uses to display the icons on your Desktop, helping your computer boot more quickly. But when something happens to this file, your icons don't display properly.

You can rebuild the icons by finding the ShellIconCache file in your main WinNT directory and deleting it. Then, the next time you log on to WinNT, the computer will rebuild the icons from scratch and create a new error-free file.



Customize the look of your icons, their size, and the text font from the Appearance tab of the Display Properties dialog box.

■ Saving A Few Steps.

WinNT offers several ways of helping you navigate the system quickly and easily, especially when considering repetitive tasks. And with a little know-how, you can manipulate WinNT to improve its performance of other tasks, as well.

Save your searches. When you repeatedly use Find, Files And Folders from the Start menu for the same tasks (such as looking for all the new files you created for the month), you'll appreciate this next step-saving option. Find lets you save your search criteria for future searches. After you've run your search, go to the File menu and select Save Search. WinNT will then place a shortcut on your Desktop that leads right to that query. Double-click this shortcut to activate it, and it will automatically perform the identical search for the most current version of your files.

Some Startup assistance. Another handy way to save steps is to put files or programs that you often use into the Startup folder on your Start menu. Anything copied into this folder is launched automatically whenever you reboot your machine. It's useful for starting programs you always want working while you are, such as a scheduler, or for launching programs you might forget to, such as important antivirus software.

In addition, you may not think to store files you're currently working on in the Startup folder so that they open the moment you boot up. For instance, if you don't finish a project at the end of the day, and you need to get right back to it the next morning, put a copy of it into the Startup folder so that it's ready when you begin working.

The easiest way of loading a document or program into the Startup folder on your Start menu is to create a shortcut to the document or program on your Desktop, then click and drag the shortcut into the Startup folder.

■ Speeding Up Your Access.

As we said, WinNT offers users many ways of cutting corners to speed up productivity, and the rate at which you access programs and other resources on the network are no exception.

On the run. One indispensable tool to know about if you're frequently looking for files on a shared network is Run. This utility, which can be found in the first section of the Start menu, is normally used for executing certain applications. However, it can also be used to quickly connect with other computers on your network.

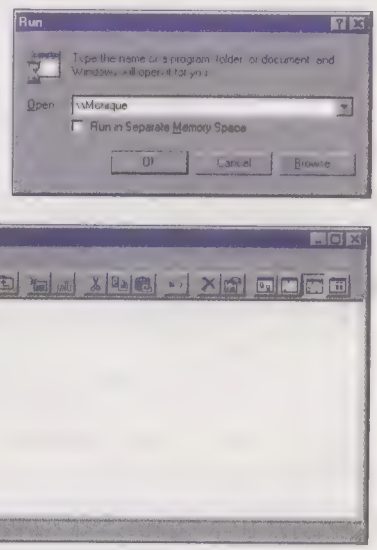
All you need is the name of the computer that you're trying to access. Then, open Run and type something similar to: **\\computer name**. Next, you'll see a small Explorer window open that provides you access into the computer.

Adjust the click rate. Another way you can save some time when opening programs or files is to change your click rate. You can alter the clicking speed required to open a file by selecting Start, Settings, Control Panel, and double-clicking Mouse.

In the section called Double-Click Speed under the Buttons tab, move the slider to the right to request a faster click or to the left for a slower click. The jack-in-the-box animation on the right lets you test how fast or slow you'll need to get your fingers working to open a file with the new settings.

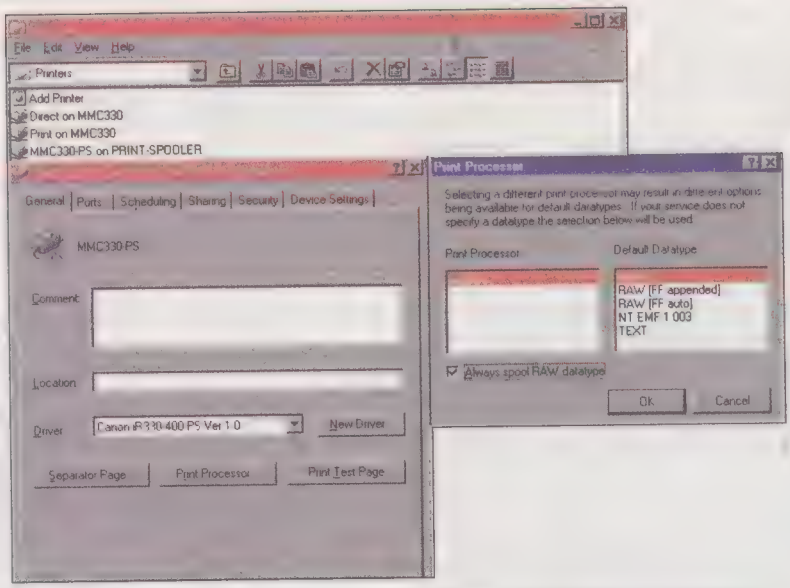
■ Powering Performance.

When it's not your settings but your system that's slowing you down, disable the services you don't need and improve performance.



Bypass the Network Neighborhood and gain quick access to another computer on your network by typing the name of the computer into the field provided in the Run window.

Improve printer spooling. One likely culprit for slowdowns can be your printer. Here's a secret to help you improve spooling performance: use the RAW data type. Some operating systems require specific information to process print jobs, such as what fonts to use, but WinNT doesn't need this help. It can use RAW files, which require no processing and can be printed as simply as graphics. This means that your print job leaves your computer ready to go, and the printer doesn't need to convert anything.



To improve the spooling performance of your printer, right-click it to access its Properties dialog box and click the Print Processor button. In the next dialog box, click the checkbox next to Always Spool RAW Datatype.

To set your printer so it always uses RAW data type, go to the Start menu, choose Settings, and select Printers. Right-click your printer and select Properties. Under the General tab, click the Print Processor button and click the checkbox next to Always Spool RAW Datatype.

Keep it to a minimum. WinNT also can run several applications at once, and in that sense, it streamlines work. However, if it's handling too many programs at once, it can become bogged down. A very simple way that you can boost performance is by minimizing applications that you're not actively working on. WinNT pumps memory into programs that are fully open and reduces output to those that are minimized on the Taskbar. Therefore, if you're not using it, keep it minimized.

Other Resources.

For even more customization secrets and tools to help you work better in WinNT, turn to some outside sources.

Resource Kit information. One in particular is the "Microsoft Windows NT Resource Kit," a book and CD-ROM package. This contains an in-depth technical guide for getting as much from WinNT as you can, along with a CD-ROM that's packed with utilities and accessories to further enhance the operating system.

The book for the "Microsoft Windows NT Workstation 4.0 Resource Kit" normally retails at approximately $70 (http://mspress.microsoft.com/prod/books/1318.htm), but you don't have to pay that to tap into the information in its pages. Much, if not all, of these details are stored at the immensely helpful—and free—Microsoft TechNet (http://www.microsoft.com/technet).

Toys that can help. The people on the Windows development team spent a little of their "extra time" and put together a package of small applications meant to help you get around the operating system. Power Toys, which you can download at no charge from http://www.microsoft.com/Windows95/downloads/contents/WUToys/W95PwrToysSet/Default.asp, aren't supported by Microsoft; however, we've been running them on our WinNT computer (even though they are labeled for Win95) and haven't had any problems. Still, there are no guarantees that they'll work on your system error-free.

The advantage of Power Toys is that you can install as many of them as you like and then turn off the ones that you don't find useful.

The advantage of Power Toys is that you can install as many of them as you like and then turn off the ones that you don't find useful. The set includes such items as the FlexiCD player for your Systems Tray; a Desktop Menu, which places a menu on the Taskbar that you can use to open items on your Desktop; and Explore From Here, a nifty tool that lets you open Windows Explorer no matter where you are on the computer system.

At the pinnacle of Power Toys is Tweak UI. This tool should already come standard with WinNT. You can use it to change mouse sensitivity, shortcut default names, the icons on your Desktop, and much more. We recommend using the Network Logon command, which tells WinNT to automatically log you in when booting up.

Also, check out the Paranoia section to enable ways of covering your tracks. This deletes all the history files from the computer whenever you log on. If you don't already have Tweak UI, you should be able to find it in the Control Panel after you download and install the Power Toys set.

Plus! features. Another useful WinNT addition is Microsoft Plus!. Again, although this product is labeled for another version of Windows, we've been running it on our WinNT computer without any problems. This is a multifaceted package that has everything from attention-diverting 3-D Pinball to desktop themes that let you customize the appearance of your PC with different sounds, wallpaper, screen savers, icons, fonts, cursors, and colors.

Another handy feature is Full Window Drag And Font Smoothing, which make text appear less jagged and windows easier to resize. Microsoft Plus! is a retail product that you can purchase from http://www.microsoft.com/catalog/display.asp?site=719&subid=22&pg=1, but the company is giving away a few of the components for free at http://www.microsoft.com/truetype/free.htm. Look for the Font Smoother And Font Properties Extension in particular.

With the help of such extras as those included in the Microsoft Plus! package, as well as understanding the secrets of the Taskbar, you'll be whizzing around WinNT in no time. LS

by Monique I. Cuvelier

Customize WinNT

Don't Let Your Systems Administrator Have All The Fun

So your computer looks like your neighbor's PC, and you want to be individual? You'll be pleased to know that it is possible to customize your Windows NT 4.0 Desktop just as you can customize your PC at home running Windows 9x.

There are many options available to personalize the Desktop within Windows NT. You can make changes to your system's appearance, sound, or to the way peripheral devices operate. Most customizing changes are made by choosing Settings from the Start menu, then clicking Control Panel. If you're using WinNT on a networked machine, keep in mind that your systems administrator may have blocked access to certain options.

Change the background. There's no need to stick with basic blue if you don't want to. Go to Settings, Control Panel, Display, Background. Here you can change the background itself by adding a pattern or an image. If you want, you can edit a pattern to make it even more personalized. Any open applications will be on top of this, so you may not really get to see it in a working environment.

Display your pictures. Any picture you have can be used as wallpaper. You can have a digital picture of your spouse, kids or even your dog, if you want. However, the picture must be a bit map (.BMP format). To make the picture available here, save it in .BMP format and place it in the WINDOWS folder on your C: drive. It will then appear in the menu on the right as a selection. Alternately, you can click on the browse button and find your picture wherever it is located. You can then choose to tile it or center it on the screen. Tiling will create multiple images to fill the screen as opposed to a single image in the middle. Play with these settings, as some pictures look better one way or the other.

Key Points

- Windows NT includes special features to make computing easier for the disabled.
- Screen savers, Desktop themes, and wallpaper bring personality to your WinNT system.
- Your mouse and keyboard can be adjusted to work at the speed that best suits you.

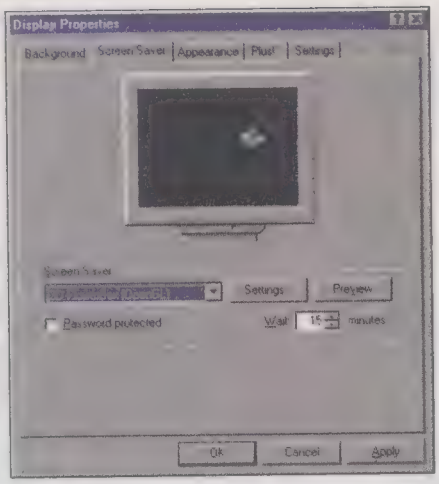
Design a Desktop. An easy way to change the look of Windows is to select a new Desktop theme. Under Control Panel, Display, Appearance, scroll the drop-down menu under Item and select Desktop. Under Scheme, make a selection from the drop-down menu. If you want to see what the whole thing will look like (not just in the preview window), click Apply, and your whole desktop will take on the new scheme. The default scheme is called Windows Standard, so you can always get back to where you started if you make a mistake. Some schemes look good in the preview window but are totally overpowering when applied to the whole screen. You can design your own desktop using the options below this window. Or, if you prefer, you can customize one of the many schemes provided. When finished, click Save As, then give your Desktop, and you can recall it at any time in the future.

Organize the Start menu. The Start menu is full of essential information, but finding it can be a chore. To make this menu less daunting, try organizing your programs in folders. Right-click the Start menu without opening it and then click Explore. In this view, you can create folders for your programs and group them together in whichever way makes sense to you. You could have folders for Utilities, Graphics, Games, Internet Applications, or whatever you need. This makes the Start menu tidier and easier to navigate.

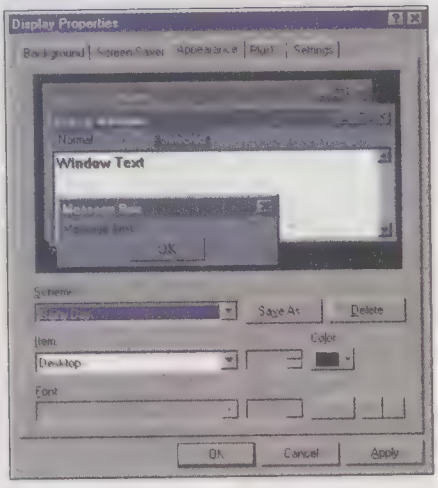
Customize your keyboard. It's frustrating to press a key a little too long and generate a row of repeating letters. Choose Settings, Control Panel, Keyboard, and you can adjust the way your keyboard behaves when you type. You can adjust the delay between when a key is pressed and when the letter begins to repeat on your screen, and you can adjust the

rate at which the letter is repeated. You can even change the rate at which the cursor blinks. A test area is provided to try out new settings before you apply them.

Adjust your mouse. There are a few options for adjusting your mouse's movement and display. For instance, you can adjust its speed or choose an alternate set of cursors. Go to Start, Settings, Control Panel, Mouse, and you can choose a right- or left-handed button configuration or select a double-click speed or movement speed. Under the Pointers tab, you can choose the cursors themselves. More cursors can be found at the various shareware sites on the Internet, and most of them are free. Additional options may be available here, depending on what mouse you have installed. For example, if you have a wheel mouse, you will be able to choose how the wheel will perform when it is used.



The OpenGL screen savers are among the best provided by Microsoft.



Pick a Desktop scheme and adapt it to your own liking under the Appearance tab.

Create Desktop shortcuts. Desktop icons are a good way to make files available for easy access. Right-click the Start menu and click Explore. You can create a shortcut simply by right-clicking the icon or the program name you want and choosing Send To and then Desktop As Shortcut from the menu. The icon created on your Desktop is a duplicate, and the original is unaffected.

Accessibility options. WinNT has some built-in features to make computing a little easier for disabled users. Click the Accessibility Options tab in the Control Panel. You can enable StickyKeys, which lets you use CTRL, SHIFT, or ALT functions while pressing only one key at a time. Another option is SoundSentry, which will display a visual warning when Windows makes an event sound.

Adjust regional settings. Use Regional Settings under the Control Panel to determine how numbers are handled in WinNT. Choose the default currency symbol, time and date formats, and whether the system of measurement used is US (gallons, quarts, feet and inches, etc.) or metric (grams, meters, etc.).

Event sounds. If you don't like the sounds WinNT makes when events occur, you can choose new ones. Go to the Sounds icon in the Control Panel, select an event, such as Exit Windows, and scroll the available sound files. Simply choose a new sound file for this event. You can preview any sounds before applying them. Sound files are in the .WAV format, and replacement sets can be found at shareware Web sites.

Change icons. You can change the appearance of some of your icons. To change the picture displayed by an icon, right-click it and select Properties from the Context menu. Choose Change Icon (if present), and you may well find that the program file itself has several icon options. If not, browse other similar program files or .DLL files for an alternative.

Custom clock. To keep track of the time in a different way, download a shareware Desktop clock such as Chameleon Clock (http://www.softshape.com). Chameleon Clock uses "skins" to change the appearance of Windows' clock, and it can log into several Internet time

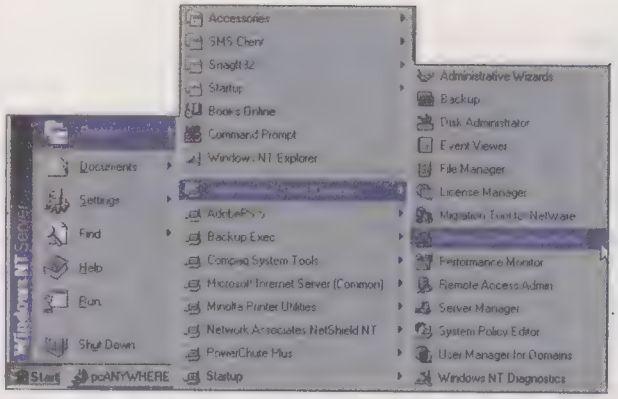
Windows Update

Microsoft included an update to the Windows desktop when it released Internet Explorer 4.0. This update has many new features that drastically change the Desktop. You can add Internet content such as sports and news tickers directly to the desktop using the Active Desktop feature. The picture also shows the enhancements to the window itself with tool buttons and file information displayed clearly. You can change the way the Desktop behaves, including opening a new window within the existing one, using the buttons for easy navigation.

A new area is also available on the Taskbar, known as the Quick Launch bar. This lets you open a program with just one click. You can drag program icons here so that you can have all of your favorites within easy reach. □

servers to make sure that your system clock is accurate at all times.

Tackle the Taskbar. Did you know that you can customize the Taskbar (where the Start menu is situated and where minimized programs and documents are displayed)? You can move it to any of the four sides of the screen by clicking and holding an empty part of the bar and dragging it to the desired position. An outline will appear to show you where it is at any given time. To place it, just release the mouse button in the position of your choice.

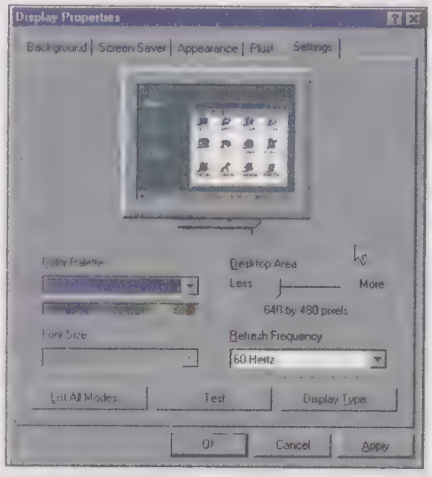


The options you see under the Administrative Tools tab will vary according to your network settings.

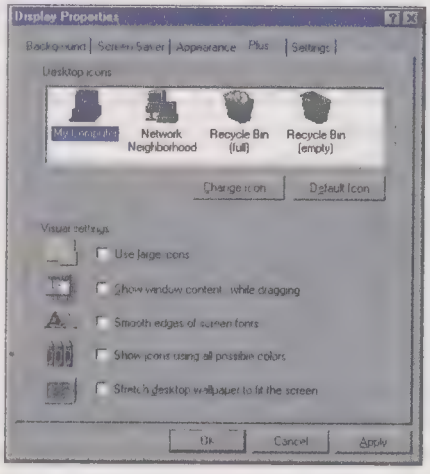
You can also change the size of the Taskbar. Run the mouse to the top edge of the Taskbar until it turns into an arrow. You can now hold down the left mouse button and drag it up to adjust the size of the bar

To alter its properties, right-click a blank space on the Taskbar and select Properties to bring up another Context menu relating to the bar itself. You can choose to have the bar slide out of view when it is not in use, always be on top of anything else, display small or large icons in the Start menu, or show or hide the clock. This menu also has a second tab that relates to the Start menu itself. Here, you can add or remove programs or go to an Explorer view for more options. This tab lets you clear the Documents menu, too.

Screen savers. Screen savers are everyone's favorite way to personalize a computer. Under Control Panel, select Display, Screen Saver. Under the Screen Saver heading, click the down arrow next to the drop-down box, and a list of installed screen savers will appear. Your selected screen saver is shown in miniature on the monitor screen, so you can get a feel for it before you actually select it and move on. Another way of seeing what it looks like is to click the Preview button.



Set the screen resolution and color depth in the Settings tab under Display Properties.



You can choose icons and text properties that are easier on the eyes.

The new OpenGL savers are quite pleasing to the eye and show off the capabilities of your machine. There also are other options. For example, you still have the old favorites such as Flying Windows, Starfield Simulation, Mystify, and Marquee (scrolling text). The latter looks much better if you select 3-D text instead, it uses the OpenGL code.

Each screen saver has a set of options to adjust its appearance. For example, with the 3D Text setup, you can change the size, resolution, speed, spin style, surface style (solid or textured – and even what texture), and of course, the text itself. You can choose to have it display the time if you can't think of anything witty to say. The 3D Text screen saver also has two Easter Eggs (hidden functions) built in. First, enter "volcano" as your text and, instead of the expected word appearing, you get a changing list of volcanoes of the world. Second, enter the words "not evil" here, and the names of the NT Product Team will be displayed.

Password protection. A good way to deter co-workers from snooping around when you leave your desk is to set a password for your screen saver. This is not a secure way to protect your computer because someone can reboot your machine and operate it without knowing the password. Password protection is not always an available option if you are using a networked PC. An administrator, possibly to save the embarrassment of being locked out of his or her own networking system, can disable it.

Under Control Panel, Display, Screen Saver, simply select the Password protected option. By selecting a value using the Wait option, you can decide how many minutes of inactivity must pass before the screen saver starts to operate. This value is important, and the only way to determine what is best for you is by trial and error. Too short a time might annoy you by kicking in every time you stop to read a memo or walk across to the coffee pot for a refill. Too long, and others can have access to your data when you go to lunch.

Fonts. The Plus! and Settings tabs under Control Panel, Display have a number of options that affect the visual settings of the fonts. Some changes may affect the performance of a slower PC, so if you find that after changing any of these settings, your system seems to drag, simply uncheck them and try again.

Under Plus!, you can smooth the edges of screen fonts, which will give them a different appearance. To tweak your fonts even more, select the Settings tab. Here, you can choose to have large icons, show the window contents while dragging it across the screen, smooth the edges of screen fonts for a cleaner look, display all of the colors used in icons instead of the default 16, or stretch the wallpaper to fill the screen. The last option can produce some odd results, depending on the image you use. But, like any other option, you can reverse it by deselecting the box and clicking the Apply button. LS

by Tony Kaye

Change The WinNT Registry

Getting To The Heart Of The OS

The Windows Registry is the central reference point for the vast majority of the operating system's configuration information. Whenever a new program or device is added to the computer, its installation program is supposed to add the appropriate entries in the Registry's comprehensive database. Unfortunately problems can sometimes occur.

Key Points

- Get away from the generics by customizing your home or company's Windows NT bootup.
- It's a dangerous world. Learn some secrets to keep your Windows NT system safe from hackers.
- We're busy people. Let us show you some methods to save time by logging in, shutting down, and powering off automatically.

When this happens, you may need to manually change the Registry. In a network environment, this is most commonly done for security reasons or to reconcile the results of a bad program set-up attempt. Several tools can be used to make changes to the Registry. Until recently, the only tools that you could use under Windows NT were the Group Policy Editor (Poledit.exe) and the Registry Editors (Regedit.exe and Regedt32.exe) programs.

However, several utilities now exist which let you make extensive changes to the Registry. These include the Microsoft SCM (Security Configuration Manager) and the ISS Security Host Manager. This latter program is found in the Windows Professional 2000 Resource Kit CD. It works on Windows 98, Windows NT 4.0, and Windows 2000 operating systems. The Microsoft SCM is available as a standalone program for Windows NT and ships as a plug-in for the Windows 2000 MMC (Microsoft Management Console).

There are also several shareware utilities that have excellent search functions. Two of these are the freeware Registrar Lite http://www.resplendence.com/registry/reglite.htm) and its award-winning full-featured shareware editor Resplendent Registrar (http://www.resplendence.com/registry/registrar.htm). These are a cut above the bundled Microsoft offerings.

For the purpose of this article, we'll be using Regedt32.exe to make several common changes to NT systems just after the operating system has been installed. Before making any changes in the Registry, be sure that it has been successfully backed up.

To update the ERD (Emergency Repair Disk), type **rdisk /s** at the command line and update the Security and SAM Registry entries. For more instructions, see these Microsoft Knowledge Base articles: Q156328 ("Description of Windows NT Emergency Repair Disk") and Q122857 ("RDISK /S and RDISK /S- Options in Windows NT"). These can be found by searching the Microsoft Knowledgebase at http://search.support.microsoft.com/kb/c.asp?fr=0&sa=gn&lng=eng.

The Registry Editors shipped with NT do not have an undo feature, so once a change is made, it's permanent until you either retype the original entry or restore the Registry. If you're unclear about how to restore a Registry key, you should review the "Restoring the Registry" Help topic in Regedit.exe and the "Restoring a Registry Key" Help topic in Regedt32.exe.

If you just want to browse the Registry without making any inadvertent changes, use Regedt32.exe. You can start it from the Run command line in the Start menu if it is not listed in the system administration programs menu. After starting Regedt32.exe, choose the Options menu and select the read-only mode. This is all that's needed to prevent accidental changes.

■ **Common Changes.** Here are several common registry changes that you may be called upon to make. These examples will deal with securing your networked NT box, removing an Internet Worm from your computer, and shutdown options. All of these changes will require you to be at an administrator user level.

Giving your NT box a company identity. You can replace the default Windows NT Logo screen that you see when you log in to an NT computer with your own organization's artwork. The Windows NT workstation uses the Winnt.bmp bit map while the Windows NT Server uses the Lanmannt.bmp bit map. Make sure the replacement file has the same resolution. Here's how you make the change:

1. Log on as an administrator user.
2. Start the Registry Editor.
3. Locate the following key and click it: HKEY_USERS\.DEFAULT\Control Panel\Desktop
4. Double-click the Wallpaper value entry. Change the name to your file's name. If you

want your logo to be tiled, change the TileWallPaperEntry to the number 1.
5. To test the result, shut down the Registry Editor and log off.

Protecting the workstation Registry from hackers. By default, NT allows network users anonymous access to a networked NT workstation computer. To remove this ability, you will need to create a value called RestrictAnonymous in the HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\LSA Registry subkey.

Log on to the computer as an administrator user. Start the Registry Editor (Regedt32.exe). Here's what you need to do to log on as the administrator:
1. Select the KEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\LSA.
2. Create the RestrictAnonymous value as a DWORD type.
3. Set this value to 1.

Warning off hackers at your NT computer. You can create a custom warning, called a logon banner, that will be displayed each time a user attempts to log on to your NT computer from the keyboard. Many organizations already have such warnings in place, so don't change it if it already exists. If your firm doesn't have such warnings, their absence may prevent successful prosecution of a computer break-in. For more information on the proper wording, consult your firm's computer support group or your lawyer. An example logon banner can be found at the Department of Energy's Computer Incident Advisory Capability Web site at http://www.ciac.org/ciac/bulletins/j-043.shtml.

You can create a logon banner with the System Policy Editor, but the program prevents a banner of more than 255 characters. You have to use the Regedt32.exe program for longer length banners. To create the logon banner:
1. Log on as an administrator user.
2. Start the Registry Editor (Regedt32.exe).
3. Select the following key: HKEY_LOCAL_MACHINE\Microsoft\Windows NT\CurrentVersion\Winlogon.
4. Double-click the LegalNoticeCaption value and enter a caption for the Logon Banner dialog box.
5. Double-click the LegalNoticeText value and enter the text for the logon banner text.

Putting out the welcome mat. On the flip side, if you want an NT computer to log on automatically, you can enter a default user name and its password in the registry, and the computer will log on to a default account. This would be useful in setting up a public kiosk for Web access. The major disadvantage to this approach is that the default account's password is stored in clear text in the registry. This means you'll have to set the security permissions to keep unauthorized users from seeing the password. Here's what you'll need to do:
1. Log on as an administrator user.
2. Start the Registry Editor (Regedt32.exe).
3. Select the following key: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon.
4. Select the Add Value menu option from the Edit menu. Add a value entry called AutoAdminLogon.
5. Make its data type REG_SZ. Enter a value of 1 when the String Editor dialog box appears.
6. Double-click the DefaultDomainName to the domain name if the computer needs to log on to an NT domain.
7. Double-click the DefaultUserName value. Enter the name of the default user account.
8. Double-click the DefaultPassword value. Enter the password and check its spelling.
9. Shut down Regedt32.exe and then log off the administrator account.

If you've made the changes correctly, you will be automatically logged on under the default user name and password. If you messed up, you can log off again and hold down the SHIFT key during the logon process until the Welcome Logon dialog box appears. Then you can log in as an administrator user to make the necessary corrections. If you decide to disable the automatic logon function, you can edit the AutoAdminLogon value you created in step four above and enter the number 0.

Enabling direct shutdown and power off for NT Servers. WinNT workstations let users shut down the workstation from the logon dialog box. However, NT servers, which are expected to be up all the time with a minimum of accidental shut downs, do not have a shutdown button on the logon dialog box. This might be a handy thing to have, especially if you have to shut down a box, and the administrator is nowhere to be found.
1. Log on as an administrator.
2. Start the Registry Editor.
3. Select the key: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon.
4. Double-click the ShutdownWithoutLogon value. To enable the Shutdown button, enter the number 1. To disable the Shutdown button, enter the number 0.
5. Shut down Regedt32.exe and then log off the administrator account.
6. When the Windows NT logon dialog box appears, it should have the shutdown button displayed.

If the computer BIOS (Basic Input/Output System) supports the power off function, you can also have the NT box turn off automatically once the shutdown process is completed. If you have a number of boxes you want to turn off in a hurry, this is a good option.
1. Log on as an administrator.
2. Start the Registry Editor.
3. Select the key: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon.
4. Double-click the PowerDownAfterShutdown value. To enable this option, enter the number 1. To reverse the process, enter the number 0 instead.
5. Shut down the registry editor and then proceed to shut down the computer.

If all goes well, the machine will not only go through the shutdown process, it will also turn itself off. LS

by Bill Hayes

Useful Facts

You can download a free tool from Microsoft to clear out bad registry entries. The RegClean utilility is described in the Microsoft Knowledgebase article Q147769. The latest release, when we went to press, was version 7364.1 (http://www.microsoft.com/downloads/release.asp?releaseid=18924). It can be used on NT and Windows 9x machines.

Want to remotely administer a number of NT egistries at once? Take a look at the 30-day evaluation of the SystemTools Multi-Remote Registry Change product (http://www.systemtools.com/reg/mreg_main.htm). □

Common WinNT Error Messages

Understanding The Problem

Windows NT is a complex operating system intended to be very secure and robust. When properly configured, NT will run very well with few problems. However, you will encounter errors on an improperly configured NT box. Listed below are a few common error messages and methods for fixing them.

Printing errors. Printing errors are common. Let's first get past some of the more ordinary ones.

Error Message: Error Writing To <printer port> For Document Printer <print job>.
Solution: The error message "Error writing to <printer port> for document printer <print job>" appears when users attempt to print jobs to a WinNT print server. The error occurs when printing to an assigned printer port. If the problem goes away when you log on as an administrator and print to the same printer, then this is a file permissions problem with the printer spool folder.

The easiest way to solve this problem is to start Windows NT Explorer. Do so by clicking the Start menu, selecting programs, and choosing Windows NT Explorer. Open the folder containing the Windows NT operating system. This is usually called C:\WINNT. If this is the case, find the C:\WINNT\SYSTEM32\SPOOL folder.

Right-click this folder and when the context menu appears, select the Security option and click Permissions. You should see that the user list does not contain the Everyone group. To fix this problem, you'll add the Everyone group and then make sure this group has the Change authorization.

First, click "Add" and then click the print server's domain, which appears in the List Names From box. Next, double-click the Everyone group in the Names box and then click OK. Click Everyone in the Name box again and then click change in the Type Of Access box. Finally, click OK twice to exit from this procedure. Close Windows NT Explorer and have a user attempt to print again. The print job should go though the printer now.

Error Message: Problem Occurs When Print Job Stays In Print Queue.
Solution: In this case, when you attempt to print a document, it shows up in the print queue but doesn't get printed out. This actually isn't a printing error of any kind. The most likely culprit is that the drive containing the printer spool folder is full. Right-click the system drive from My Computer and select Properties from the Context menu to confirm the culprit. You should have at least 100MB (megabytes) of free disk space in addition to the space taken by the memory page spooler.

If you have an additional drive in the system, you can attempt to change the spool directory to a drive that has free space. However, you should first do a search for temporary files ending in .TMP by using the Find Files Or Folders option in the Start menu's Find entry. We have seen badly configured UPS management software generate a large number of temporary files in the C:\WINNT\SYSTEM32 folder. These should be deleted to free up additional space.

If you can't remove enough from the system disk to make a difference, then you'll have to move the print spool folder to a different hard drive. This can't be a network drive. For Windows NT 4.0 boxes, open the Control Panel from either the Start Menu's Settings entry or from My Computer. Once the Control Panel is running, double-click the Printers icon. On the Printers File Menu, click Server Properties and then click the Advanced tab. When the dialog box opens, type in the desired path in the Spool Folder box. Finally, click OK.

Error Message: RPC Server Is Unavailable.
Solution: The byproduct of this error message is that users can't use the NT print server from NT Workstations. Even though users have been successfully printing to an NT printer server from NT Workstations, one or more of them begin to complain at the end of the day

Key Points

- Learn why print jobs get stuck in the print queue.
- Find out why programs sometimes don't run from your diskettes.
- Check out the tools that will help you troubleshoot and maintain your NT. Two Web sites with great demos and free stuff are Systems Tools (http://www.systemtools.com/free.htm) and Winternals Software (http://www.winternals.com/downloads).
- Use the Windows NT Diagnostics Administrative Tool to make a printout of your system's configuration. It will help you sort out hardware error messages. To find it, open the Start menu, select Programs, and choose Administrative Tools.

that they can no longer get printouts. They may also get an error message stating, "The RPC Server is unavailable."

This problem is caused by several users having the Printer Properties dialog box open to watch the print queue. Instead of normally powering the NT Workstation down, the users are turning off their computer's power switch. When the print server attempts to find the recently shut off computers to update their printer queues, it fails to find them. While trying to communicate with the powered-down machines, the print server begins to ignore valid printing requests from other users until the print server gives up on the shut down computers.

To solve this problem, update your site to the latest service pack. This problem was first fixed under Service Pack 4. You can get Service Pack 6a, which at press time was the most recent version, at http://www.microsoft.com/ntserver/nts/downloads/recommended/SP6/allSP6.asp. This will work with both NT Server 4.0 and NT Workstation 4.0.

Error Message: STOP <0xc000021a> In <WINLOGON.EXE>.
Solution: If you are printing a large print job, and your NT box suddenly displays the blue screen error message "STOP 0xc000021a in WINLOGON.EXE," you will see a blue screen that displays a message similar to the one above. This is actually happening when your NT box's screen saver starts. To fix this problem, upgrade you NT installation with the latest service pack from Microsoft. The blue screen Winlogon.exe error was first fixed under Service Pack 5.

Program Errors. Program errors can occur in innumerable ways. Let's looks at some of the more common problems.

Error Message: 16 Bit MS-DOS Subsystem: Config.NT. The System File Is Not Suitable For Running MS-DOS And Microsoft Windows Applications.
Solution: After cleaning up some old files you found in the C:\WINNT\SYSTEM32 directory, you get an error when you start up an MS-DOS program or an old 16-bit Windows program. The message states, "16 bit MS-DOS Subsystem: config.nt. The system file is not suitable for running MS-DOS and Microsoft Windows Applications."

The problem has occurred because of missing files; you inadvertently erased the Command.com file used by MS-DOS and 16-bit Windows applications. You should restore this file by expanding the compressed file Command.co_ from the WinNT distribution CD-ROM disk. If drive E: is the CD-ROM drive, the command you should type is **c:\expand e:\i386\command.co_ c:\winnt\system32**.

If you suspect that you've deleted more than just the Command.com file, you should run the emergency repair procedure. To do this, you'll need the Windows NT CD, the setup diskettes, and your ERD (Emergency Repair Disk), which you should have created during setup and updated regularly.

Boot the computer using setup disk 1 and then insert setup disk 2. When prompted at the first screen, choose Repair. Next, choose the Verify Windows NT System Files option to allow the setup program to inspect your system and determine what will need to be replaced. You will be told to insert the emergency repair disk. Finally, you will be prompted to restart your computer to complete the process.

While running a 16-bit program you may get access violation error messages.

Error Message: System-Write Protect Error.
Solution: If you run a program from a write-protected diskette and then close the program, and you get the error message above, then you may be having problems running programs from diskette. The disk cannot be written to because it is write protected. Please remove the write protection from the diskette in drive A:

The problem occurs when the operating system attempts to write a modified data page back to the diskette. Naturally, the error message doesn't show up if the diskette is not write-protected. In order to correct this problem, you will have to update your NT 4.0 installation to the latest service pack. This problem was corrected under Service Pack 6. You should update to the latest service pack in order to solve this problem.

Access Violations. While running a 16-bit program you may get access violation error messages. Programs that run portions of their programs in different memory areas cause this problem. While this parent and child programming scheme works under earlier versions of Windows, memory management is different under NT. The parent portion of the program attempts to track the existence of child programs but fails to update its own internal tally of active child programs. The problem was solved under Service Pack 5. You should update to the latest service pack in order to solve this problem.

Event Log Error Messages. These are simple messages, but they do cause their share of problems. Let's take a closer look.

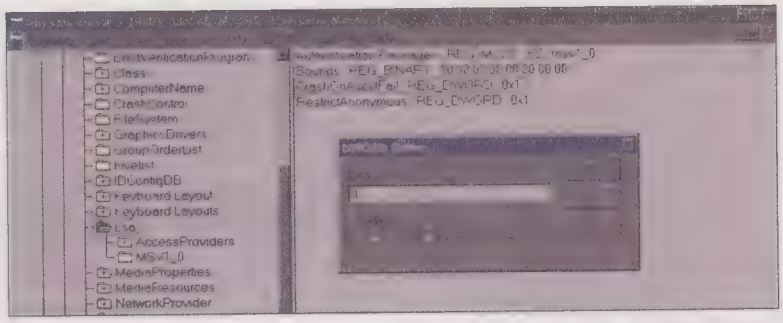
Error Message: The System Log Is Full or The Application Log Is Full.
Solution: You will see the messages, "The System Log Is Full" or "The Application Log Is Full" from time to time. These may stem from default event log settings. By default, the event log file (Appevent.evt) and the application log file (Appevent.evt) are set to 512KB (kilobytes).

You can solve this problem either by increasing the size of these files or by allowing new events to overwrite old ones. To make the change, open the Event Viewer, which can be found in the Start menu's Administrative Tools group. Next, open the Event Viewer. From the Log menu, select the type of log for which you want to specify settings.

To increase the log file size, you will first have to clear all log entries using the Log menu's Clear All Events option. Select the Log Settings option from the Log menu and change the Maximum Log Size to a larger file size for the log. You can use the up and down arrows to change the file size, or you can type in a selection. You will have to repeat this process for each log that you want to make bigger.

If disk space is at a premium, choose the Event Log Wrapping option and select Overwrite Events As Needed. There is also the Overwrite Events Older Than [] Days option in the Log Settings selection; this lets you overwrite a log file based on the age of the event. This can be from one to 365 days. After you've made your changes, restart the system.

Error Message: STOP: C0000244 (Audit Failed). An attempt to generate a security audit failed.



The CrashOnAuditFail key can cause your NT server or workstation to go offline if the Security Log becomes full. Set it to the number 0 to change this behavior.

Solution: This happens when the Full Security Log causes blue-screen error. When the Security Log becomes full, a blue screen error message with the notation above appears. This problem is actually by design to make sure that security events do not go undocumented. Once the maximum log size has been reached, Windows NT will shut itself down if one of two other settings have been made. If CrashOnAuditFail registry key is set to 1 or if the Do Not Overwrite Events As Needed log option has been selected, the blue screen will appear once the log is full.

In some cases, the blue screen may not appear, but instead the system will run very slowly after an administrator logs on. If this is the case, regular users will not be able to log on to the machine. The system may also report RPC (Remote Procedure Call) errors.

In order to solve this problem, first check the Event Manager to see if the Security Log Event Log Wrapping is set to Do Not Overwrite Events As Needed. If so, make sure this option is not selected. Instead, choose Overwrite Events As Needed. As an alternative, you could put off a crash by increasing the size of the Security Log or by reducing the number of events audited through User Manager.

Next, check to see if the CrashOnAuditFail Registry key is set. To do this, first start the Registry Editor (Regedt32.exe) from the Start Menu's Run line. Next, find and select the key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa. If the CrashOnAuditFail Registry key exists, make sure it's set to the number 0 instead of the number 1. Make the change if necessary and exit the Registry Editor by selecting the Exit option from the Registry menu.

■ **Hardware Errors.** Hardware errors are difficult to avoid. The sheer number of hardware combinations is responsible for the difficulties.

Error Message: CHKDSK Detected Minor Inconsistencies On The Drive.
Solution: This is a false alarm for a failing drive. While running the CHKDSK disk utility in read-only mode with one or more files open or in use by the operating system, an error message appears that leads you to believe that your hard drive may be failing.

The message might state, "CHKDSK detected minor inconsistencies on the drive." Or it might provide the following detailed message if you're running Remote Access Services (RAS):

Errors found, F parameter not specified
Corrections will not be written to disk
\WINNT\SYSTEM32\RAS\DEVICE.LOG

This is caused by the way the NT operating system handles open files. CHKDSK will give false or misleading reports if it encounters open files in use by the operating system. You may also see misleading free disk space readings from CHKDSK as a result of these open files.

Error Message: Hardware Malfunction. Call your hardware vendor for support. The system has halted.
Solution: This happens when Windows NT hangs during boot process. You may also see an additional line with one of the following messages caused by NMI (non-maskable interrupt) calls, which take priority over software and basic device interrupts (such as the keyboard):

NMI: Parity Check / Memory Parity Error
NMI: Channel Check / IOCHK
NMI: Fail-safe timer
NMI: Bus Timeout
NMI: Software NMI generated
NMI: Eisa IOCHKERR board x

Unfortunately, Windows NT does not have very sophisticated hardware error checking. This makes troubleshooting a challenge for the user. At this point, you may want to call in a hardware technician. If you are the hardware technician, you'll want to follow through with some of the following basic steps.

If you get a memory error, reduce the number of extra memory modules. Depending on the system, you will need to keep a minimum of either 16 or 32MB (megabytes). Once you've removed the extra memory, restart the system. If the system starts normally, shut it down and add one memory module at a time until you've located the bad module.

The problem may also occur if you've recently added some used memory from another computer. Some computers are notoriously sensitive to unmatched memory modules.

If you're within your computer's warranty period, call the manufacturer to get replacement memory modules. If your computer is out of warranty, you should consult with a reputable memory vendor such as American Memory Corporation (http://www.datatek-intl.com/amc) or one of the many excellent computer accessory vendors such as PC Connection (http://www.pcconnection.com).

If you suspect you're having trouble with an adapter card, remove each card one at a time and restart the computer until the system starts normally. Then place the cards back in the computer one at a time and restart the computer after each addition. It could be that one of the cards has worked its way loose, and simply reseating each card will solve the problem.

If you believe you're having trouble with a newly added adapter card, you should do two things. First, go to the expansion board vendor's Web site and see about getting updated drivers and additional troubleshooting or configuration steps. If this step doesn't help, check your computer's BIOS (Basic Input/Output System) settings and make sure that you are running with the most current Flash BIOS for your computer. If not, go to another computer and download this software from your computer vendor's Web site.

For complex server subsystems such as RAID (Redundant Array of Inexpensive Disks) assemblies and RAID controller cards, you should use the diagnostics supplied by the manufacturer. Companies such as Compaq (http://www.compaq.com) or Dell (http://www.dell.com) ship diagnostic utilities on a separate CD-ROM or on diskettes with their products; these are usually self-booting. LS

by Bill Hayes

Troubleshoot WinNT

Making Adjustments To Enhance Your Operating System's Performance

Microsoft Windows NT is one of the most stable members of the Windows operating system family, but that doesn't mean it is flawless; accidents and errors do happen. And when they occur, it's often difficult to know how to fix them since this isn't the easiest system to navigate. However, there are a few guidelines and resources you can follow that make troubleshooting easier.

Preventative Maintenance. You can avoid many crashes and burns on WinNT by taking a few steps to eliminate the possibility of disaster. In addition to making backups of all your data, you can also take action to ensure that the system runs as smoothly as possible and minimize the chances of something going wrong.

Repair disk, stat! Before you do any tweaking on WinNT, take the precaution of creating an Emergency Repair Disk. That way, if something goes wrong with an installation or a fix, you have a better chance of correcting any problems with one. Making a diskette is simple and worth the extra time it requires, especially when you contrast it with the potential for disaster if you don't make one.

To create the repair diskette, you'll need a blank diskette to insert into your diskette drive. Next, select Run from the Start menu, then type **rdisk /s** and click OK. When the Setup window opens, agree to create an Emergency Repair Disk by clicking the Yes button and follow the prompts until you're finished.

Defrag the hard drive. Whenever you do anything to a file, from creating to editing to deleting, the hard drive becomes fragmented. Think of this process as the data on your computer stepping out of formation as you shuffle around files. When files are scattered around as a result of fragmentation, it takes your system much longer to find anything and programs don't load as quickly. Periodically, you need to "defrag" your hard drive to put everything back in its place.

Microsoft, for some reason, didn't think WinNT would need defragging when it developed it, so unlike the other Windows operating systems, a defragmenting tool is not included. You'll need to download one to do the job. Try Diskeeper (http://www.execsoft.com/diskeeper/diskeeper.asp), a robust program that can keep your computer in order with minimal effort. You can download the program for a free 30-day trial, but a full version costs $39.95. After installing, follow the directions to complete the defragmentation process.

Hard drive hogs. There are oodles of unneeded and unused files on your hard drive that are hogging up space, and therefore, affecting performance. Letting these latent files use too many resources will prevent the system from properly defragging.

Getting rid of the temporary files and rogue files left over from failed installations is easy because they all share common file name extensions. To delete these files, first close all applications to make sure none are in use. Then, select Find, Files Or Folders from the Start menu and type ***.tmp, *.bak, *.old, ~*.*** into the Named field. Once you find them, you can highlight and delete these files directly from the Find window.

Also check the TEMP folder on your hard drive for more unwanted files. Anything stored in this folder is automatically deleted after a period of time, but you can rush the process by emptying it yourself. Keep in mind that WinNT may not let you delete everything from that folder because some of the files might currently be in use.

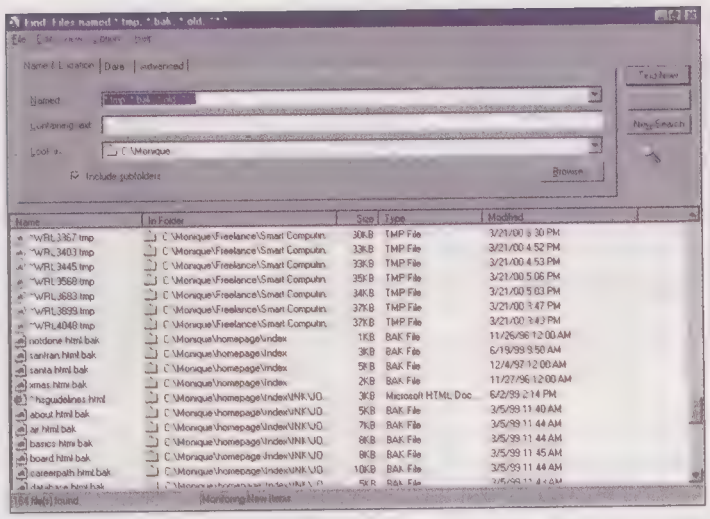
In addition, clean out your Recycle Bin, which is where files usually go by default. Save the system a step by periodically deleting items from this holding tank. To do this, right-click the Recycle Bin icon on your Desktop and choose Empty Recycle Bin from the pop-up menu.

Gain space from freeloaders. A step beyond deleting unwanted files from your computer is to dispose of unused applications. These really gobble up room on your PC, and removing them can pick up the speed of your computer considerably. If only uninstalling

Key Points

- Prepare for disaster by taking precautions such as creating an Emergency Repair Disk.
- You can easily boost Windows NT performance by closing applications that you're not currently using and allocating more resources to running the programs that you do need right now.
- WinNT has a few built-in safety devices to protect you when you've made a fatal error.

were as simple as deleting files, however, your task would be much simpler. Unfortunately, it's more difficult to uninstall programs because of all the pieces each one contains. The trouble is that when a program installs, it doesn't go to one place in a tidy little bundle. It places files all over your system to interact with the programs already in place. It's usually impossible to find each file and delete it by hand, so you'll need a special tool to help with this process.



Find unused files by searching for the following: *.tmp, *.bak, *.old, and ~*.*

Many programs come with their own uninstall utility, which you can use to uninstall everything relating to that program. If one isn't available, use the WinNT Add/Remove Programs option. It usually does the job, but it is also well known for leaving orphaned files in some cases. You can access this tool by clicking Start, Settings, Control Panel, and double-clicking the Add/Remove Programs icon. Next, scroll through the list of programs until you find an unwanted one, click it to highlight it, and then click the Add/Remove button.

You can also consider buying a package such as Norton CleanSweep 2000 (http://www.symantec.com/sabu/qdeck/ncs), which retails for about $30 and is adept at scrubbing computers. After installing this or any other uninstall application, follow the manufacturer's directions to clean up your WinNT system.

Got your backup. Backing up is like health insurance. You hate to waste time on it when things are going well, but if you don't take the time to do it and disaster strikes, you'll most definitely suffer. And now that computer systems are so much bigger than they used to be, simple diskettes usually don't do the trick. You'll need to invest in a tape drive or a CD-RW (compact disc, rewriteable) drive to store everything.

If you decide to take the tape drive route, look into a QIC-40 or QIC-80 drive (QIC stands for quarter-inch cassette), a DAT (digital audio tape) drive, or a magnetic tape drive. Iomega (http://www.iomega.com) has cornered the tape drive market and features something for everyone. In addition, Hewlett-Packard carries a nice, fairly inexpensive CD-RW drive that lets you write and record (http://www.hpcdwriter.com).

Performance Tweaks. If you notice that WinNT is behaving sluggishly or is somehow not up to par, you can streamline its performance with a few easy maneuvers. This can be as simple as deleting unused files or disabling systems that aren't necessary.

Quick print. The default settings on the printing options often are not set for your needs, but they're easily customizable. For each printer on your system, you can arrange the priority for printing speed, set application response, and make more efficient printing possible on a network.

First, go to the Start menu, choose Settings, and select Printers. Right-click the printer you want to change and choose Properties. Under the Scheduling tab, you can optimize how fast a file comes out of the printer by clicking Spool Print Documents So Program Finishes Printing Faster. **Spooling** is the process of transferring a document to a buffer (memory area) so that the printer can access it when it's ready to print the data.

If you also choose the next option, Start Printing After Last Page Is Spooled, your system will be slightly slower while it waits for the document to transmit entirely to memory, then on to the printer. So, select the Start Printing Immediately option to start printing as soon as the first page of the document is spooled. After making your changes, click OK.

Sack the screen saver. One of the simplest ways to speed up a sluggish system is to shut down "OpenGL" screen savers. These diversions, composed of a type of 3-D graphics language, can be fun because you can type whatever message you want into them or watch the flower turn into a box over and over, but they also eat into your system resources.

If you have one of these screen savers, turn it off by right-clicking an empty space on the Desktop and choosing Properties. Click the Screen Saver tab and use the drop-down list to select any option that doesn't have "OpenGL" next to it. When you've made your selection, click Apply, then OK.

More isn't better. WinNT is masterful at multitasking, letting you run several resource-heavy programs at once. However, all this juggling comes at a price. A slow system might be the result of too many active services and applications running simultaneously.

In addition to limiting the number of applications you use during a session, cut down the unnecessary background services that WinNT uses. Since WinNT is meant for networks, many associated services are triggered automatically, even though you might be working alone. Access these services by going to the Start menu, choosing Control Panel, and double-clicking Services.

First of all, try shutting down the Computer Browser and Network services. You can also disable Messenger, ClipBook Server, and the two Network DDE services. These normally let you talk to other computers on a network. If you are using Option Pack 4, but you aren't using the Web services, then you can shut down FTP, IIS Admin Service, and Microsoft SMTP Service.

To disable a service for the current session, highlight it in the list and click the Stop button. On the other hand, if you want to permanently disable the service, click the Startup button, then click the Disabled option under Startup Type and click OK. Next, click Close to exit the Services dialog box.

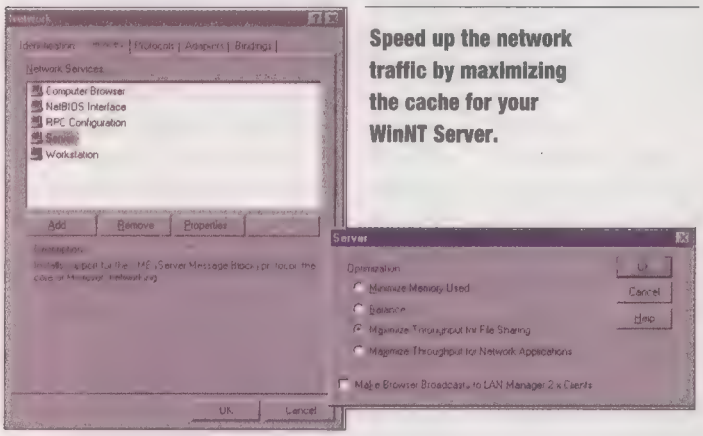
Kick-start the boot. Another easy way to speed up WinNT performance, at least during startup, is to reduce the amount of time you have to wait before the system completes booting. Whenever you turn on your computer, the computer waits for a few seconds (sometimes for several seconds) before launching the default operating system.

If the time period before the operating system launches has you hanging for a while, you can speed things up a bit. Right-click the My Computer icon on the Desktop and select

Properties to open the System Properties dialog box. Choose the Startup/Shutdown tab and look at the area that says System Startup. In the Show List For area, adjust the number of seconds that elapses before WinNT kicks in. Click Apply, then OK.

Making programs more active. Another performance tweak you can adjust from the System Properties dialog box involves the options under the Performance tab. Use these options to boost the overall performance of active programs.

While WinNT is good at multitasking, and you feasibly can open as many copies of programs as you like, the operating system gives priority to the active window by pumping resources into it, while borrowing from the windows you're not working with. The Application Performance section under the Performance tab contains a slider that lets you set how much energy you want going to the foreground program as opposed to background programs. Move the slider to Maximum to put more oomph into active windows.



Speed up the network traffic by maximizing the cache for your WinNT Server.

The Virtual Memory section, below Application Performance, is another way for you to increase the performance of programs. Virtual Memory borrows space from the computer's hard drive for additional storage if the RAM (random-access memory) is tight. This area, called a **swap file**, gives your computer a little extra room for running big applications without making you install more RAM. True, it's not as fast as more RAM, but it lets you run more and/or bigger programs than your system normally would allow.

Click the Change button in this section to increase the swap space on your drives. Use the Space Available section as a guide regarding how much you can allocate to this use. Also, pay attention to the Recommended amount in the Total Paging File Size For All Drives section. Click OK, then click Apply, OK before closing the System Properties dialog box.

Cache flow. By increasing WinNT Server's system cache, you can further improve network performance. (This tip doesn't relate to Windows NT Workstation because it isn't used to administer networking.) WinNT uses a cache to store network traffic (input and output), so it can easily access information that is commonly shared by computers.

On networks that have heavy traffic, you can increase the size of the system cache and therefore speed up the exchange and flow of data. First, go to the Start menu and select Control Panel. Double-click Network and choose the Services tab. Then, click the Properties button and select the Maximize Throughput For File Sharing option.

Going solo. If you are using WinNT as a standalone system that is not part of a network, you can increase performance by telling your computer that you're working solo.

Right-click My Computer and select Properties. Find the Hardware Profiles tab, choose Original Configuration, and click the Properties button. Under the Network tab, click the checkbox next to Network-Disabled Hardware Profile to disable all the network support drivers in the hardware profile, and as a result, speed up your standalone system.

■ Smooth Modifications.

Periodically, you should perform a few upgrades and tune-ups to keep WinNT running smoothly. The following steps are simple and will help you get the most out of the operating system.

Set your screen to SVGA. Monitors manufactured in the last three years are SVGA-capable (Super Video Graphics Array), and adjusting these settings gives you more screen space and a clearer display.

To make this change, right-click an empty area on the Desktop and click Properties. Select the Settings tab and look at the Desktop Area section. If you have a 15-inch monitor, set the area to 800 x 600. If you have a 17-inch or larger monitor, set the area to 1,024 x 768 or more. Click Test to make sure the settings will work and follow the on-screen directions for the screen test pattern. Finally, click OK to apply the changes.

Full service. Keep your computer running at its fullest ability by downloading the most current service pack release. Service packs are updates put out by Microsoft that you can download to fix bugs, apply patches, enhance what's already there, and even add new features to the operating system.

First, close all applications and download the current service pack from the Microsoft Web site (http://www.microsoft.com/ntserver/nts/downloads/recommended/sp6). Install the service pack, according to the directions, and then reboot your system.

Turn back time. After you've been adjusting WinNT for a while, perhaps by editing the Registry, and the system ceases to function properly, you might be able to undo any harm by switching to the Last Known Good Configuration.

The Last Known Good Configuration is stored each time someone logs on and everything functions properly, so that if something goes awry, you can reload this configuration and override any errors. To do this, reboot the system and watch for the message: "Press spacebar NOW to invoke Hardware Profile/Last Known Good menu" and press the spacebar. Press L to switch to the Last Known Good Configuration and WinNT should return to its most recent fully functioning state.

TechNet to the rescue. When you're not quite sure where to turn if you have a problem with WinNT, you can bypass the expensive Microsoft Help Desk and go directly to Microsoft TechNet (http://www.microsoft.com/technet). This Web site is a lifesaver; not only for the home user of Microsoft products, but also for high-level developers.

TechNet dishes out how-to information on anything the company publishes, as well as provides forums for interacting with Microsoft experts and others who might share your problem. The site also sponsors free events during which Microsoft representatives tell you how to get the most out of programs and services. LS

by Monique I. Cuvelier

WinNT Compatibility Problems & Solutions

Resolve FAT & Device Driver Issues

If you are considering upgrading to or running Windows NT 4.0 for the first time, it is important to be aware that not all programs or hardware will be compatible with this OS (operating system). Although it looks and feels like Windows 95/98 (Win9x), there are many differences that make the change an important one to research before you proceed.

The first thing to note is that WinNT uses its own file system that is not compatible with the FAT32 (file allocation table) format found in the later versions of Win95 and in Win98. The NTFS (NT File System) is unique to WinNT. The OS will not recognize a hard drive that is formatted with the FAT32 format. However, the previous format, FAT16, can be read and accessed. Win98 can update FAT16 to FAT32 "on-the-fly," or without affecting the data already stored on the drive, but there is no way of reversing this procedure.

If you intend to run WinNT as a dual boot system with Win9x, remember that you will need separate hard drives or hard drive partitions that may not be read by both systems. To create a partition, you may want to consider a program such as Partition Magic from Power Quest (http://www.powerquest.com/partitionmagic/index.html), which will let you add one without affecting existing data.

Key Points

- If WinNT will not read the information on one of your hard drives, check the file system used.
- It is probably worth ordering the Service Pack CD instead of downloading it. The CD may contain updated drivers and datanot included in the download version.

WinNT 4.0 has a very familiar feel to anyone used to using Win9x. This is because when Microsoft introduced it, the idea was to add the ease of use that Win9x provides with the power and added security of the WinNT system. However, WinNT is based on a 32-bit **kernel** (The kernel is the essential **module** [a piece of program] of the OS.), which means that it is not compatible with older 16-bit programs that were designed for Win3.1 or DOS. Win9x contains a considerable amount of code to allow these older programs to run, but WinNT does not have provisions for running 16-bit programs. Any programs that make direct hardware calls will not run unless they are designed for WinNT, so you can discard just about all of your games, too.

Another thing to remember is that WinNT 4.0 is not Plug-and-Play compatible. This means that it is not capable of detecting your hardware automatically, as Win9x does. All of your peripherals, including hard drives, CD-ROM drives, backup tapes, printers, scanners, or anything else will have to be installed manually.

Device Driver Problems. When Microsoft upgraded Windows NT 3.51 to version 4.0, it completely redesigned the architecture of the way the OS handles video. This means that any drivers written for the older OS are completely incompatible with NT 4.0 and can cause all kinds of problems if you try to use them.

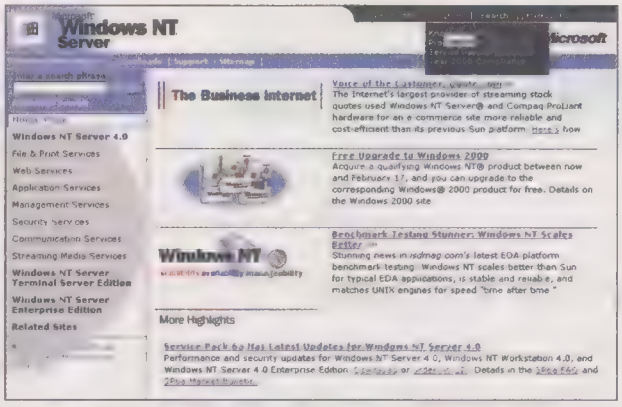
If you have a video card that is in the list of supported equipment, you can select it from the list presented when you run the NT setup program. But if your card is not listed, complete the setup using a standard VGA (Video Graphics Array) setting and contact the video card manufacturer for an updated driver. In almost every situation, you will find the new drivers on the maker's Web site. Several sites will help if you are still having problems. Try http://www.windrivers.com or http://winfiles.cnet.com/drivers/video.html. The latter site provides you with links to the vendor sites for just about every product you can think of. Be sure to double check which OSes the driver works with before you download and install it.

Video drivers are not the only items affected by this change to the OS architecture. Printer and SCSI (Small Computer System Interface) drivers have also changed, so you will need to check with the manufacturer about getting new drivers for these, as well.

Older SCSI cards may still be supported, although they don't appear in the list during setup. These have been moved to the DRVLIB directory on the NT distribution CD. If you

have one of these cards, you will have to copy the related files to a diskette before running the NT setup program. You can then install the driver from the disk at the appropriate time.

In some cases, WinNT 4.0 can fail to recognize a second drive in a two hard drive EIDE (Enhanced Integrated Drive Electronics) setup. The WinNT 4.0 Setup program incorrectly identifies the EIDE adapter as a generic ATAPI (Advanced Technology Attachment Packet Interface) controller, which automatically loads the ATAPI.SYS driver. You can correct the problem by disabling ATAPI.SYS and loading the appropriate EIDE driver. To do this, click Settings on the Start menu, then select Control Panel, Devices. Scroll down to atapi, select it, click Startup, and select Disabled.



Start at the source when you need answers about Windows NT compatibility issues. Head to Microsoft's Web site.

NTWare.com is a good place to find Windows NT files.

■ **Third-Party Solutions.** A few unlucky people may not be able to solve their device driver compatibility problems by downloading an updated drive from the manufacturer's Web site. It's frustrating, but there is still hope. If any third party programmers have come across the same problem as you, someone may have modified existing drivers or written new ones to work with the NT operating system. These drivers are, obviously, unsupported by the manufacturer, but most work well, at least well enough to let you use your new hardware.

In some cases, it may be possible to use Win95 or 98 drivers to at least partially run your hardware. Video cards, for example, may run well, but without 3-D support, using a driver designed for the 16-bit versions of Windows. If all else fails, try using generic drivers. VGA drivers for video cards or SoundBlaster drivers for sound cards may operate well enough to get by on. Keep checking back with the manufacturers periodically to see if there is a new driver made specifically for your hardware available. Also, try sending an e-mail or letter to the support team to ask about new driver releases.

Will an alternative driver work? Success really depends on the OS-specific calls made by the device that uses the driver. One wrong hardware call can cause the whole system to crash. If you're unlucky enough to have this happen, you will need to remove the driver and start over.

The bottom line is, if a driver can't be found, you will not be able to run your new hardware in WinNT 4.0. We recommend that you check and see what hardware is compatible with WinNT before you buy anything new. Ask the dealer or check the Web site before you part with your money and avoid a lot of driver headaches.

■ **Security Issues.** There are many security issues surrounding WinNT 4.0. Fortunately, most of these have been resolved by the service packs and updates Microsoft has made available on the Internet. It is very important for any WinNT administrators to maintain a close watch on Microsoft's Web site to make sure they keep up-to-date with any security patches that are released, as well as any bug fixes that are recognized and resolved.

If you are new to WinNT, it is vital that you are aware of a common security problem with this operating system: The Administrator account is very easy for anyone to obtain. Microsoft recommends that you rename this as soon as possible and give it a unique alpha-numeric password to protect it. You can go one step further by creating an account called Administrator and giving it Guest status on your system. This not only makes it very difficult for a hacker to compromise your system, it also means that anyone looking for the Administrator account will find it, but will not have any compromising access. LS

by Tony Kaye

Windows NT Resources

For the latest information, news items, and downloads relating to all versions of Windows, go straight to the source. Microsoft's own Web site is the best place to keep up to date with the happenings in the world of Windows. http://www.microsoft.com/windows/default.asp

If you are looking for a specific driver or simply want to scan for the latest updates to your hardware, the WinDrivers site is well worth a visit. http://www.windrivers.com

This general Windows site has specific listings for Windows NT. Here, you will find drivers, as well as a good selection for shareware and freeware. Also included are links to CNet, this site's new parent company. http://winfiles.com

This is an independent site with lots of valuable information and files. It includes bugs and their fixes, shareware, games, FAQs, hints and tips, and much more. http://www.ntware.com

Keep an eye on file updates, bug fixes and new virus .DAT files at this site. Helps to keep your system up to date and functioning properly. http://www.file-watch.com □

WinNT Updates & Patches

Create A Safer, More Efficient Operating System

Computers, software and operating systems are always evolving. Almost as soon as you finish signing your check for the newest system or software version, you'll see advertisements for a newer model with more bells and whistles. If the computer industry has taught users anything, it's that you'll have to update even the latest and greatest products from time to time. Here, we show you how you can find and download updates and patches for Windows NT 4.

Key Points

- There are different Service Pack versions for Windows NT 4. Because they are cumulative, you can download the latest Service Pack to get all the upgrades included in earlier editions.
- Use the Microsoft Knowledge Base to get specific, detailed information about WinNT 4 patches and updates.
- Each download page offers easy-to-follow instructions and links to related articles.

What's New? In March, Microsoft released a patch that resolves a security problem with three Registry keys in NT 4 (http://www.microsoft.com/technet/Security/Bulletin/ms00-008.asp). These three keys are AEDebug, User Shell Folders, and DataFactory. These keys do not work together in any way, but they are grouped together in this patch because the error is similar. The default permissions on these keys pose a security problem because a malicious user could take unauthorized actions on a computer he or she interactively logged on to. Logging on interactively means logging on to a computer locally rather than through a network server. The specific vulnerability of these three keys is as follows:

- **AEDebug key.** In the event of a system crash, an administrator can use this key to enable a remote debugger to diagnose the problem. However, the concern is that nonadministrative users can change the values that determine which code triggers the debugger and then cause the system to crash.
- **User Shell Folders key.** This key reveals the location of folders that all users of a single computer share, including a common startup folder. Again, the problem occurs because normal users can set its value and insert malicious code that could cause problems.
- **DataFactory key.** This is actually made up of two keys that control the Remote Data Services in the Microsoft Data Access Components. With the problems associated here, an unauthorized user could gain access and disable security functions.

You'll find other updates and feature enhancements at the Microsoft Windows NT Server Downloads page (http://www.microsoft.com/NTServer/all/downloads.asp). The updates listed on this page are grouped in two categories: Critical and Recommended. Once you identify the updates your system needs, downloading is easy. Click the link for the update you want, read the associated information (you'll also be able to read about system requirements for particular downloads and find links to more detailed information about what the patches correct), and then click the download link at the top of the page. If you have an application open, you should save your work and close the program before you click the download link. Follow the on-screen instructions to save the update file to your system. Once the download is complete, you'll need to restart your computer so Windows can update its settings.

Critical Updates. As of press time, there were three downloads available under the header of critical updates for Windows NT Server 4.0. Be sure to read all the associated text for each upgrade so you know exactly what the patch intends to do and which problems it solves.

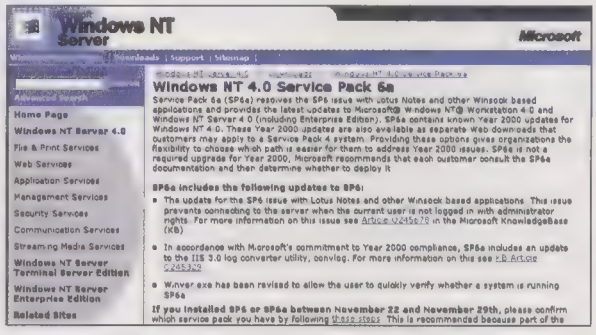
Update For Web Connections Using SGC. This update, which is available at http://www.microsoft.com/ntserver/nts/downloads/critical/schannel/default.asp, addresses problems associated with Web surfing. Some computers can't connect to Web sites that use SGC (Server Gated Cryptography), which is an encryption method used when a secure connection between a Web server and the connecting computer is required. If you're experiencing this on your system, you can install the update to correct the problem.

Internet Explorer Security Update 9.30.99. This second update is available at http://www.microsoft.com/ntserver/nts/downloads/critical/favorites/default.asp and aims to keep users safe from malicious Web site operators. Microsoft Internet Explorer 5 includes a feature (ImportExportFavorites) that allows users to export a list of their favorite Web sites to a file or to import a list of favorite sites. However, a Web site operator

could gain access to this control and write potentially destructive system commands to your computer. This patch eliminates that weakness and keeps a Web site from running unsafe **ActiveX** (a Microsoft program that lets Web site creators make interactive, multimedia Web pages) controls without your permission.

Update For Security Vulnerabilities In "Scriptlet.typlib" and "Eyedog" ActiveX Controls. This patch (http://www.microsoft.com/ntserver/nts/downloads/critical/scriptlet/default.asp) takes away vulnerabilities found in two ActiveX controls: Scriptlet.typelib and Eyedog. Both of these controls are incorrectly marked as "safe for scripting," which poses a security problem. Developers use the Scriptlet.typelib control to generate Type Libraries for Windows Script Components. The "safe for scripting" error allows Web pages to create or modify files on your computer. This patch takes off the "safe for scripting" tag, which in turn causes Internet Explorer to ask a user for confirmation before loading the control.

Windows diagnostic software uses the Eyedog ActiveX control, and it too is erroneously marked "safe for scripting." This error allows a Web page to call up Registry information and gather machine characteristics.



Windows NT Service Pack 6a includes all the latest updates and patches, as well has any fixes that may have been incorporated into earlier update versions.

■ Recommended Updates.

Although the problems addressed by the following patches aren't as severe as the ones discussed in the previous section, they can improve your WinNT performance.

Windows NT 4.0 Service Pack 6a. Microsoft's latest WinNT service pack is available at http://www.microsoft.com/ntserver/nts/downloads/recommended/SP6/allSP6.asp. The good news here is that Microsoft's Service Packs are cumulative. That means it contains all the updates and patches in previous Service Packs, as well as the new upgrades. Microsoft released Service Pack 6a to correct a problem found in Service Pack 6 that involved Lotus Notes and Winsock-based applications. The problem prevented computers that did not have full administrative rights from connecting to a server. Service Pack 6a also provides year 2000 updates, but you do have the choice of downloading separate Y2K updates for a Service Pack 4 system.

Even though Service Pack 6a contains all updates contained in earlier Service Packs, you can install Service Pack 4 or 5 instead. The download for Service Pack 4 is located at http://www.microsoft.com/ntserver/nts/downloads/recommended/NT4SvcPk4/NT4SvcPk4.asp; and you'll find the download for Service Pack 5 at http://www.microsoft.com/ntserver/nts/downloads/recommended/sp5/allsp5.asp.

If you do choose to download Service Pack 4 or if you have downloaded it previously, you will need to download the Windows NT 4.0 Post Service Pack 4 Hotfix Rollup from http://www.microsoft.com/ntserver/nts/downloads/recommended/NT4PostSP4Hotfix/default.asp. This update combines many Service Pack 4 hotfixes into one self-installing package. However, it's important to know that this package does not include the newest editions of individual hotfixes. You'll have to get those with the latest Service Pack, which presently is Service Pack 6a.

Windows NT 4.0 Resource Kit Support Tools. Tools to support, administer, and troubleshoot the WinNT 4.0 server are available in one self-extracting, compressed executable file at (http://www.microsoft.com/ntserver/nts/downloads/recommended/ntkit/default.asp).

In addition, you can download the Windows NT 4.0 Resource Kit Supplement 4 at the New Tools Download page at http://mspress.microsoft.com/reslink/nt40/toolbox/Supp4/supp4_newtools.htm. Supplement 4 provides more than 60 new tools and utilities. Some of the add-ons include Remote Administration scripts, Remote Command Service, Domain Monitor, Visual File Information, and Dependency Walker. A complete list of the new tools and what they do is available at the Web site.

NETDDE.EXE Update. This patch, which is available at http://www.microsoft.com/ntserver/nts/downloads/recommended/NetDDE/default.asp fixes the NETDDE.EXE failure to Relay WM_DDE_TERMINATE To Remote Clients problem in WinNT 4.0 Service Pack 4 and/or Service Pack 5. This problem occurs when a server running WinNT 4.0 is involved in a DDE (dynamic data exchange) conversation with a remote client computer.

Security Configuration Manager. Before you can use this update (http://www.microsoft.com/ntserver/nts/downloads/recommended/scm/default.asp), you must have Service Pack 4 or newer installed. Once that's done, you can take advantage of this update to consolidate all your security-related system settings into a single configuration file.

Windows NT Server 4.0 Option Pack. If you want to install this option pack, which is available at http://www.microsoft.com/ntserver/nts/downloads/recommended/NT4OptPk/default.asp, you'll need to have Microsoft IE 4.01 and WinNT Service Pack 3. This option pack includes the following: Internet Information Server 4.0, Microsoft Transaction Server 2.0, Microsoft Message Queue Server 1.0, and Internet Connection Services for Microsoft RAS.

System requirements and installation procedures are detailed on the download page. However, you should realize that downloading the entire option pack can take awhile. The download for Windows NT Workstations 4.0 will take two hours and the download for WinNT Server 4.0 will take nine hours using a 28.8Kbps modem. You can, however, select specific parts of the pack to download and then go back later and get the rest.

Update For Allowing Blank Passwords From Earlier Versions Of Clients For Windows NT 4.0. There's a problem with Service Pack 4 involving a password change. It happens when a password change for a WinNT domain account is made from a LanManager client. Once the change is made, someone can log on interactively on that account and make network connections from other systems using a blank password. The hotfix located at http://www.microsoft.com/ntserver/nts/downloads/recommended/MSVFix/default.asp fixes this problem. The fix for this problem is also included in the latest Service Pack. LS

by Marla Hardee Milling

Windows How-Tos

All too often, many users pigeonhole themselves into only doing certain things or working with certain programs on their computers. After all, if surfing the Web is so much fun, and all you need your PC for writing letters and balancing your checkbook, you may not notice that your Windows Desktop is not customized for your particular needs or that you're not getting the most from your hardware.

Here, we give you some quick reference tips on how you can customize, tweak, and improve your OS (operating system), whether it's Windows 95, Windows 98, Windows NT, or Windows 2000. Many of the tips will work for all the OSes while others are specific to a single one. In addition, some of the settings we discuss will depend on the hardware you have installed, so use our tips as a general reference point and then explore what you have.

Change The Date & Time

Win9x. In both Win95 and Win98, there are two ways to access the controls for changing the date and time on your system. First, you can click Start, select Settings, click Control Panel, and then double-click Date/Time. You also can open the Date/Time Properties window by right-clicking the clock in the Windows System Tray, which is in the lower right-hand corner of the Taskbar, and clicking Adjust Date/Time.

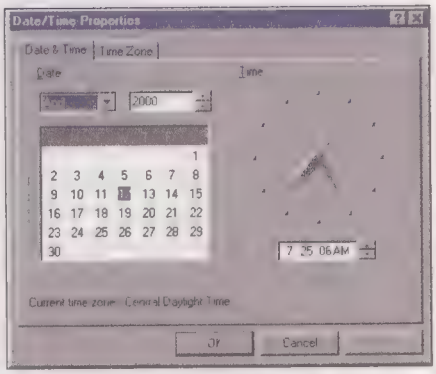
Once you have the Date/Time Properties window open, you'll see two tabs, Date & Time and Time Zone. Click the Time Zone tab first to tell Windows which time zone you live in. That way, when you set the date and time, it will be correct for your particular time zone. On this tab, you can also choose whether Windows should automatically adjust your system clock for daylight-saving time.

Use the Date & Time tab to set the date and time. In the Date field, use the arrows to designate the month and year and then click the date. In the Time field, highlight the present entry and type in the correct time. Make sure you use the arrows next to this field to correctly set the clock for a.m. or p.m., too.

WinNT and Win2000. Click the Start Menu, select Settings and Control Panel, and then double-click the Date/Time icon to open the Date/Time Properties dialog box. Click the Date & Time tab.

On the left are two fields with the month and year, and beneath them is a calendar that indicates the date. On the right, you'll see an analog-style clock with the hours, minutes, and a.m./p.m. settings underneath. To change the month, year, or the a.m./p.m. setting, click the up and down arrows to the immediate right of the displays. To change the date, click the appropriate day on the calendar. To change the hour, minute, or second setting, click the number and type in a new one.

If you want your computer's clock to automatically adjust when daylight-saving time occurs, make sure you select the Automatically Adjust Clock For Daylight Saving Changes checkbox on the Time Zone tab.



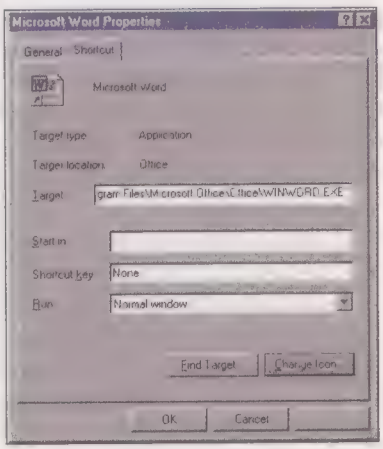
To adjust the date and time in Win9x, simply use the up and down arrows next to the function and click the calendar day.

Customize Icons

Win9x. Generally, programs install their own icons, which are the tiny pictures you see on the Desktop that you double-click to run a program. Some of these pictures are program icons while others are shortcut icons. You know that an icon is a shortcut if you see a little arrow in the lower left-hand corner of the picture. It's important to note that you can only change shortcut icons; you can't change program icons.

To change a shortcut's icon in Win9x, right-click the icon and choose Properties. This brings up a window with two tabs. The one we're concerned with here is the Shortcut tab, which tells you where the program is located on your hard drive; it contains a button titled Change Icon. Click this button to open a window that lets you browse your computer for different icons. Sometimes, the program manufacturer will give you a selection of icons to choose from. You can also find many icons in Win98's Themes directory (which is usually found on your hard drive at C:\PROGRAM FILES\PLUS!\THEMES). Finally, you can find other icons by clicking the Start button, selecting Find and then Files Or Folders, and then typing *.ico or *.dll in the Named field.

If you don't see a Shortcut tab as mentioned above, you're trying to change a program's icon, not a shortcut's icon. You'll need to create a shortcut, which you can do by right-clicking the icon and selecting Create Shortcut from the

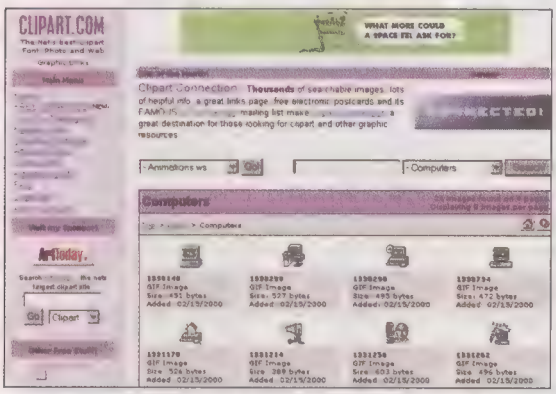


If you're running Win9x, right-click a program's shortcut icon, then click the Shortcut tab to find a new look.

pop-up menu. The shortcut will appear in the same place as the original program icon.

You can make your own icons in a paint program, or you can use a program such as IconForge (http://www.cursorarts.com/ca_if.html). If you want to use someone else's creation for private, noncommercial use, some collections of icons are given away for free on the Web. Visit a site such as The Whole Internet Guide To Clipart (http://www.best-of-web.com/computer/clipart_icons.shtml) or Clipart.com (http://www.clipart.com) for hundreds of icons and links to free icon sites. Either download the file or right-click the picture and select Save Picture As to save the pictures to your system.

WinNT and Win2000. To change the graphic used for a specific shortcut icon, such as one on your Desktop, right-click the icon and choose Properties from the resulting pop-up menu. Select the Shortcut tab and click Change Icon. The icon you are presently using, plus any other options the program's manufacturer provided, will appear in the Current Icon field. You can also click the Browse button to select from among any of the icon files in your system.



Many Web sites, such as Clipart.com, offer a vast collection of free images that you can download and use as icons.

If you want to see an extensive selection of system icons, type **%SystemRoot%\system32\SHELL32.dll** in the File Name field and click OK. All the Windows icons will appear in the Current Icon window, and you can take your pick.

If you don't see a Shortcut tab as mentioned above, you're trying to change a program's icon, not a shortcut's icon. You'll need to create a shortcut, which you can do by right-clicking the icon and selecting Create Shortcut from the pop-up menu. The shortcut will appear in the same place as the original program icon.

WinNT and Win2000 also let you change the size of all the icons on your system, as well as the appearance (size and font) of the text beneath them. Click Start; choose Settings, Control Panel; and double-click the Display icon. Click the Appearance tab and select Icon under the Item field. To change icon sizes, click the up and down arrows next to the number to the right of the Item window. The default size for most schemes is 32; if you make them much larger, your window displays will be difficult to navigate.

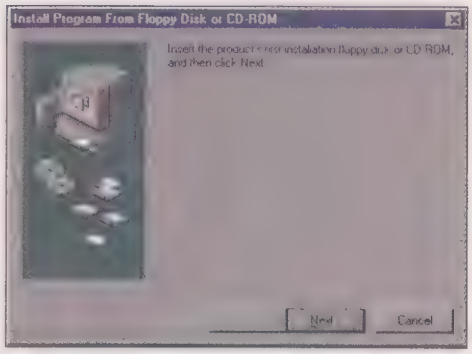
To change the size and appearance of the text that appears under an icon, move down to the Font field and make your changes. You may want to click Apply to see how the changes will affect your Desktop before you save them. Click Cancel if you change your mind.

(NOTE: You should be very careful when using this feature because it not only affects the icons on your Desktop but also every icon in your display. Changing the icon text also changes many of the drop-down menus in various Windows programs. You may like the way a different font looks on your Desktop, but it can quickly make a menu bar or display window a mess.)

Use Add/Remove Programs

Win9x. You can figure out which software you have installed on your system by using the Control Panel's Add/Remove Program applet. Click Start, select Settings and Control Panel, and then double-click Add/Remove Programs.

In the Add/Remove Programs Properties window, the first tab is Install/Uninstall. If you want to install new software from a diskette or CD-ROM, click the Install button and follow the Installation Wizard. Many programs install themselves automatically, but you can use this Install button for any software that doesn't. Also on this tab, you will see a list of software that Windows can automatically remove from your system. Click any of these programs that you want to uninstall and then click the Add/Remove button. Windows will delete as much of the program as it can and then update the **Registry** (a database that contains information about user



The Windows Installation Wizard, which is included in all four operating systems, makes adding programs easy.

preferences and system configuration in Win95, Win98, and WinNT) for you. It's best to uninstall programs using Add/Remove Programs instead of simply deleting folders that contain old programs, so your Registry remains up-to-date.

Some components may not uninstall using this process, so you will need to remove them by hand. To remove leftover files, you need to know in which directory they are stored, so be sure to make a note of this so you can find them later. If you have moved the program's shortcut from the Start menu or the Desktop, you may need to delete this by hand, too.

The next tab is for Windows Setup, which lets you install or uninstall portions of the Win9x operating system. You will need your original Windows installation CD-ROM to install new components to Windows.

The third tab here allows you to make a Startup Disk, or boot disk. A boot disk is a diskette that contains the PC's essential startup files, which let the computer boot from it rather than the hard drive. If your hard drive were to become corrupted due to a virus or power surge, a boot disk can get your computer up and running so you can start figuring out the problem. Insert a blank, formatted diskette into the diskette drive and click the Create Disk button.

WinNT. Open the Start Menu, select Settings and Control Panel, and then double-click the Add/Remove Programs icon.

To add programs, click the Install/Uninstall tab and then the Install button. The Windows Installation Wizard will prompt you to insert the CD-ROM or diskette that contains the program files. Click Next to have Windows search for an installation or setup file. If Windows doesn't find one automatically, you can enter the command line

(file location and name) for the setup file, or you can click Browse to find the appropriate file on the diskette or CD. (Setup files are usually named Setup.exe or Install.exe.) Once you have located the file, click to select it, click Open, and then click Finish. The program installation will begin, so follow the prompts that Windows gives you.

(NOTE: If you cannot locate a setup or installation file, the program may not have been written for Windows, so you will not be able to use the Add Programs utility to install it.)

WinNT can automatically remove programs listed in the installed programs field on the Install/Uninstall tab. This is also how you change (add or delete) a program's installed components. Select the program you want to remove and click Add/Remove. If the program supports the addition or deletion of specific components, Windows will prompt you to make a choice. If the program has an uninstall wizard, Windows will prompt you to continue. If it has neither, the operating system will ask you to confirm the deletion, after which point file deletion will begin.

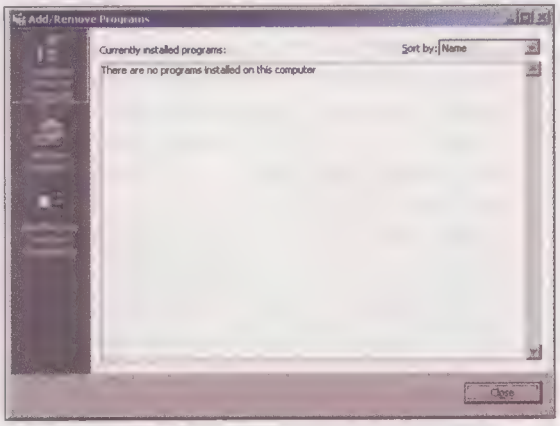
(NOTE: If WinNT tells you files cannot be removed or if it prompts you to decide whether you want to delete a file, the safest course is to leave these files in place.)

If a program has an add/remove program components feature, it will appear as an option immediately after you click Add/Remove. At that point, follow the provided instructions to add or delete components. However, be aware that few programs other than Windows offer this option. If you are not prompted to add or delete components, do not continue with the process unless you want to delete the entire program.

Add/Remove Programs also contains the Windows NT Setup utility, which is where you can add or remove optional components such as games and communications options. Click the Windows NT Setup tab and select from the available options. For more information about the subcomponents of each category, click Details. Then, select the components you want to install and click OK. You may be prompted to insert the WinNT installation CD.

Win2000. To get to Add/Remove Programs in Win2000, click Start; select Settings, Control Panel; and double-click Add/Remove Programs. Microsoft modified the Add/Remove Programs feature in Win2000 to give it a new, streamlined appearance and enhanced features. Instead of two tabs, you can now choose from the following three buttons that are displayed in a vertical bar to the right of the main window: Change Or Remove Programs, Add New Programs, and Add/Remove Windows Components.

The Change Or Remove Programs feature lets you delete a Windows program and its associated files or change the installed components of the program. Older programs and some third-party programs may not appear here, so you'll have to remove or alter them manually. A new feature in Win2000 lets you sort programs by name, size, frequency of use, and date last used.



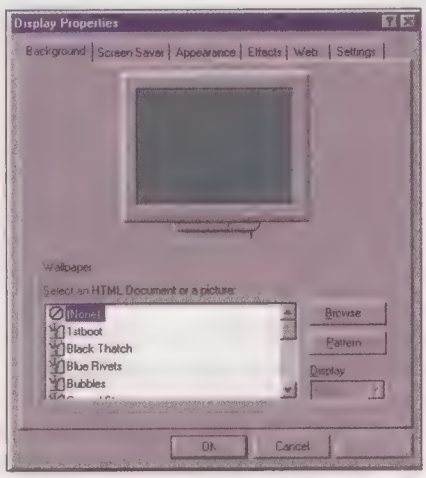
Microsoft gave the Add/Remove Programs feature a new look in Win2000 by adding three intuitive buttons.

To remove or change a program, click the Change Or Remove Programs tab, select the program, and then click Change/Remove. (With some programs, you may see separate Change and Remove buttons.) Follow the prompts for your program. If it lets you add or remove components, you will be prompted to do so; however, you may need your program's original installation CD or diskettes.

If you choose to remove the program, Win2000 will remove as many files as it can and prompt you before removing files that other programs may use. Be aware that when you select this option, Win2000 may remove the program from your system without any further prompts.

The Add New Programs feature lets you add programs from a CD or diskette, add utilities and device drivers, or obtain Windows updates over the Internet. To install a new program, click the CD Or Floppy button to start the Windows Installation Wizard. Follow the prompts at each stage of the process, and Win2000 will automatically install the program. To update Windows, click the Windows Update button, and Microsoft Internet Explorer will connect you to the Microsoft Windows Update Web.

The Add/Remove Windows Components option lets you add or delete optional Windows components, such as messaging and network services, from your system. Choose the items you want to add or delete, then click Details to select from the individual items within each component. (A shaded box means only certain features will be installed by default.) You may need your installation CD to use this option.



The Display Properties window is the gateway for customizing your Desktop settings in all four operating systems.

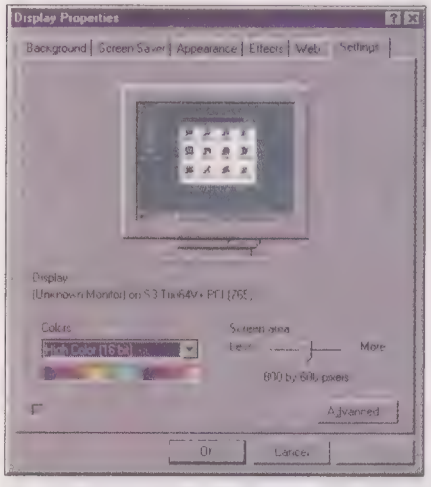
Manage Desktop Settings

Win9x. If you don't like the way your Desktop looks, you can change many of its settings in the Desktop Properties window. You can get to this in a couple of ways. First, you can right-click any blank area of the Desktop and choose Properties. Second, you can click the Start button, select Settings, click Control Panel, and then double-click Display. Either action opens the Display Properties window, which contains tabs and options that affect your video card, monitor, and display adapter.

The Appearance tab lets you choose colors, sizes, fonts, and other visual effects for your Desktop. In the top half of this tab, you'll see a picture of a sample Desktop. Click the piece of

the picture that you want to change, such as the window bars (active and inactive), text, message box, etc. Then the customizable options for that bar or element will become active so you can change them one by one. Your font choices are limited to those that you have installed on your system, and your color selections will be limited by the number of colors you have set to display. You can either choose a color from the boxes that show when you click the arrow next to Color, or you can click the Other button on the palette to create a custom color. For the Window bars, you can choose two colors, and Windows will make a gradient between the two.

The range of colors you have available is determined by the choices you make on the Settings tab. Under the Screen Area (in Win98) or Desktop Area (in Win95) section of the Settings tab, you can choose the resolution of your computer screen; that is, how large it is in pixels, such as 800 x 600 pixels, or 1,024 x 768 pixels. You may not have all possible resolutions available because this is dependent on what kind of video card and monitor you use. As you increase the resolution, the on-screen elements will become finer and more detailed. As a result, pictures will look more realistic,



The Settings tab in the Display Properties window lets you set your screen resolution and color display.

and text will have fewer jagged edges. However, higher resolution also means these elements will display on-screen much smaller.

On the Settings tab, you can also choose how many colors are displayed on your screen. As with resolution, your pictures will look more realistic the higher you set your color choice. Your choices are limited by the physical properties of your video card, the drivers you are using, and how your monitor displays different colors. Check your manufacturer's site for online help or driver upgrades that may let you improve your video performance.

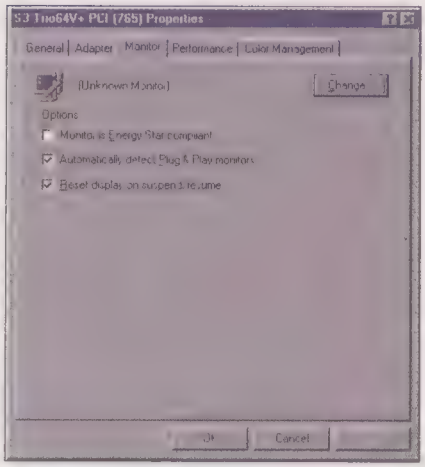
If you're using Win98, and you click the Advanced button on the Settings tab, you'll see a window that may have various tabs, depending on what your video card is capable of. You will always have a General tab, from which you can choose either small or large font sizes, decide whether to have a Settings icon in the Taskbar, and tell Windows whether it needs to restart your computer when you make changes to your settings. The Adapter tab tells you which display adapter your video card is using. From this tab, you can choose to change the adapter if you have upgraded drivers, and you also may be able to change your screen's **refresh rate**. The refresh rate is the number of times per second that your computer screen image is renewed; a fast refresh rate makes a screen easier to view.

The Monitor tab lets you change Monitor drivers and gives you a few other simple options. One lets Windows automatically detect Plug-and-Play monitors, and another will let you reset your display after your monitor has been suspended. (Not all monitors support Suspend and Resume energy-saving functions.)

The Performance tab lets you control how much hardware acceleration Windows uses. If your system is having trouble with high video settings (for example if you don't have enough memory to support your video settings), you can turn down the acceleration rate to improve your overall computer performance.

Two other standard tabs that you might find in Win98's Display Properties window are labeled Effects and Web. The Effects tab lets you change your Desktop icons for items such as My Computer and your Recycle Bin. You'll also find options to change other visual effects on the Effects tab. These options include whether you want to use large icons, show icons using all possible colors, animate menus and lists, and whether you want to smooth the edges of screen fonts.

The Web tab lets you set up the Active Desktop and the Internet Explorer Channel Bar. Choosing these items can make your Desktop operate more like a Web page, with active items such as real-time stock tickers, single-click selection of items, and the ability to subscribe to Internet content "channels" from your Desktop. From this tab, you also can click the Folder Options button to determine how your folders open and display. Your style



In Win9x, clicking the Advanced button on the Display Properties Settings tab opens a window with hardware-specific options.

choices include Web, which makes your computer look and act more like a Web page; Classic, which defaults your view to the old-school Windows settings; and Custom, which lets you configure how your folders display based on a number of settings.

There may be other tabs that let you control functions of your video card, such as how it handles 2-D or 3-D video and more. You may see a Color Management tab that lets you save color profiles for different monitors. Other tabs may let you handle color correction (the balance of red, green, and blue in different video channels). The options for 2-D and 3-D properties may be very complex, so check the technical manual or online help for your video card, monitor, and display adapter before changing these default settings.

WinNT. To manage the appearance of your Desktop in WinNT, click the Start button and choose Settings, Control Panel.

To set your monitor's resolution, which controls how much Desktop area you have, double-click the Display icon, select the Settings tab, and change the Desktop Area settings. The higher the resolution, the more your Desktop becomes compressed. You can also use the Color Palette field on the Settings tab to specify how many colors Windows uses to display the items that appear on your Desktop. Use the Refresh Frequency field to tell your monitor when to refresh; the higher the number, the less flicker you will see on your screen.

The available resolutions, number of colors, and refresh frequencies for your Desktop will vary based on your monitor and video card. Before you save changes, click the Test button

to see if your monitor and video card will support the new settings.

To alter the color and appearance of the Desktop, program windows, and dialog boxes, WinNT and Win2000 use color groupings called schemes. You can select a standard scheme or create one of your own.

To choose a standard scheme, click Appearance and click the arrow next to the Scheme field. Select the various options and note how the colors change in the display window. You'll see how the borders, backgrounds, and fonts of your Desktop and windows will look with each scheme.

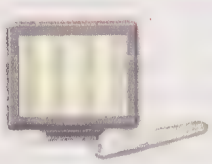
To create a custom scheme, select the item you want to modify from the Item drop-down menu and change its size and/or color by selecting the appropriate options. If the item includes text, you can change the font and size, as well. To test the scheme on your Desktop, click Apply. To save your customized scheme, select Save As and give the new scheme a name.

Win2000. To change your Desktop appearance settings in Win2000, click Start; choose Settings, Control Panel; and double-click the Display icon and choose the Settings tab. In Win2000, the Desktop Area is now called Screen Area, but you can modify settings the same way. Drag the slider to the right or left; the higher the number, the more compressed the screen becomes. In addition, the Color Palette area is now simply called Colors, but you will make your changes in the same manner.

To set the refresh frequency, click the Advanced button on the Settings tab. In the resulting window, click the Monitor tab and adjust the refresh frequency in the Monitor Settings area.

As noted above, the scheme color groupings work the same in Win2000 as they do in WinNT, so refer to those instructions.

Change The Wallpaper



Win9x. Changing your wallpaper is one of the simplest ways to change the look of your Desktop. Both Win95 and Win98 come with wallpaper choices for you, but you can also use almost any picture as the backdrop of your Desktop. Once again, you'll need to get to the Display Properties window by either right-clicking the Desktop and choosing Properties or clicking the Start button, selecting Settings, clicking Control Panel, and then double-clicking Display.

In the Display Properties window, click the Background tab. In the Wallpaper section, you can select one of the pictures provided, or you can browse your system to find another wallpaper graphic. Whichever route you decide on, you'll see your choice displayed on the monitor above. Next, you can make some choices about how the picture is displayed. In both operating systems, you can choose Center or Tile. If the picture is large enough to cover a good portion of your Desktop, you'll probably want to have it centered. When the picture is centered, the normal screen color will show at the edges where the picture doesn't quite fill the screen.

You can also choose to have smaller pictures tiled. In this setting, the picture is shown repeatedly until it covers the entire Desktop. Depending on the size of your picture, you may see two copies or a hundred copies.

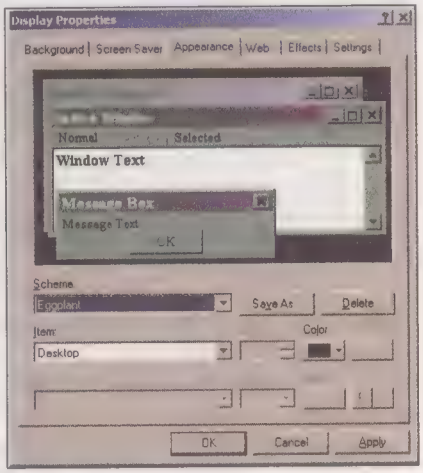
If you're using Win98, you can also choose Stretch. If the picture is stretched, Windows will force it to conform to your Desktop size. No outside color will show, but objects in the picture may be distorted. Experiment with different pictures and different settings to find the ones that suit you best.

WinNT and Win2000. Display Properties handles the wallpaper settings in both WinNT and Win2000. You can choose from Windows-standard wallpaper, or you can select any HTML (Hypertext Markup Language) document or .BMP (bitmap), .JPG (Joint Photographic Experts Group), or .GIF (Graphics Interchange Format) graphics file stored on your computer.

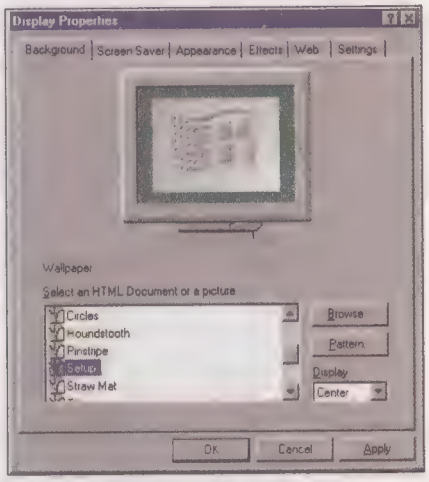
To choose standard wallpaper, click Start and select Settings, Control Panel, Display. Click the Background tab and click the various wallpaper options provided. WinNT options are mainly patterns, while Win2000 provides several scenic photographs to choose from, as well.

Click Apply to view the wallpaper on your Desktop before you actually authorize the change. Use the Display option (Picture Display in Win2000) to specify whether you want to center a single image of the wallpaper item on your screen or tile (duplicate) it across the entire Desktop. Centering works nicely for a large graphic, but most of WinNT's patterns work best with the tile option because they take on the appearance of true wallpaper.

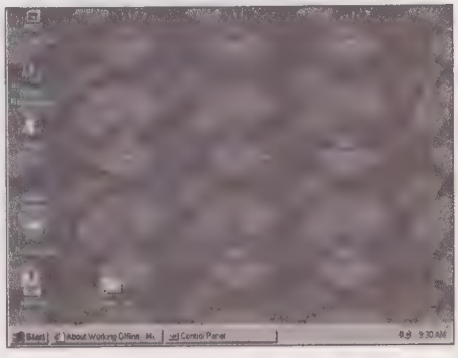
To look for new wallpaper possibilities, click Browse to navigate through your system and look for choices. If you have a particular HTML or graphics file in mind, navigate to the folder where it is stored. Once you find the file you want to use, select it and click Open.



With WinNT and Win2000, you can color-coordinate your Desktop settings by using Schemes.



Click the Background tab on the Display Properties window to set your wallpaper in all four operating systems.

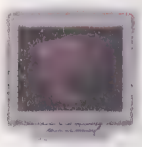


If you choose a smaller image, such as this one, for your Desktop wallpaper, you may want to consider tiling it.

WinNT and Win2000 will add it to the choices in the Wallpaper field. Click the file to view it in the sample window. To test how the wallpaper will appear, click Apply, and it will appear on the Desktop. To save the image to your Desktop, click Save.

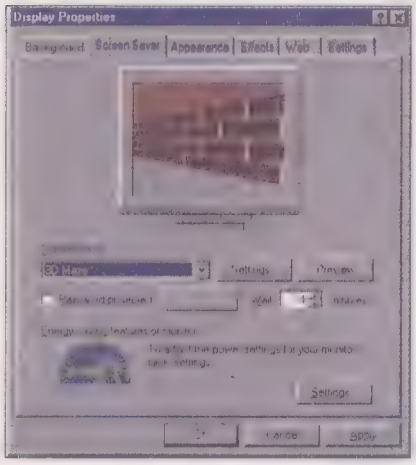
(NOTE: Depending on the file you select, both WinNT and Win2000 may require you to enable Active Desktop. This is an Internet Explorer-related feature that should not affect your system performance.)

Set The Screen Saver

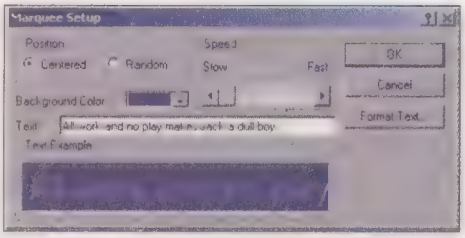


Win9x. The Screen Saver tab in the Display Properties window lets you choose a screen saver and set certain options for when and how it displays. Both Win95 and Win98 come with a variety of screen savers from which you can choose, but if you've installed a screen saver of your own, it should show up in this menu, as well.

Click the down arrow in the top field in the Screen Saver area of this window and choose the design you want to use. You can preview the screen saver on the monitor screen that is included in the window. To set the value for how many minutes of inactivity Win9x waits before activating the screen saver, click the up and down arrows next to the Wait field. Next to the Wait field, you'll see a section where you can choose to have your screen saver password protected. If you put a check mark in this checkbox, once the screen saver is active, you cannot access the system without the password. In addition, you may find a section to adjust any energy-saving features your monitor might have.



You can set up your screen saver through the Screen Saver tab in the Display Properties window.



You can use the Marquee Display screen saver option to have a favorite quote or slogan scroll across your monitor screen.

Depending on the screen savers you have installed on your system, you may be able to click the Settings button in the Screen Saver area to set an option that lets you temporarily disable the screen saver by choosing a corner where you keep your mouse pointer. You also may be able to choose how fast the screen saver responds to mouse movement and how fast Windows will present the demand for a password if you have one enabled.

WinNT and Win2000. WinNT and Win2000 offer a number of default screen savers; you can access all of them in the Control Panel's Display applet. You also can add screen savers of your own that you purchase or download from the Internet.

To enable or change a screen saver, click Start and choose Settings, Control Panel, Display. Click the Screen Saver tab and scroll through the various options; as you click each one, you'll see a small preview in the display window. To see how a screen saver will look on your Desktop, click the Preview button.

One of the default screen savers in both WinNT and Win2000 lets you set up formatted text, such as your company name or a favorite quote, to scroll across the screen. To do this, select the Marquee Display option and click the Settings button to create your masterpiece.

After you choose a screen saver you like, click the Settings button to determine its size, speed, and coloration (not all these options are available for all the screen savers). Change the Wait value to set how long the period of system inactivity should be before the screen saver kicks in. If you want, you can add password protection to your screen saver by checking that checkbox. When you are away from your computer, and your screen saver is running, no one will be able to disable the screen saver and access your system unless he or she knows your password.

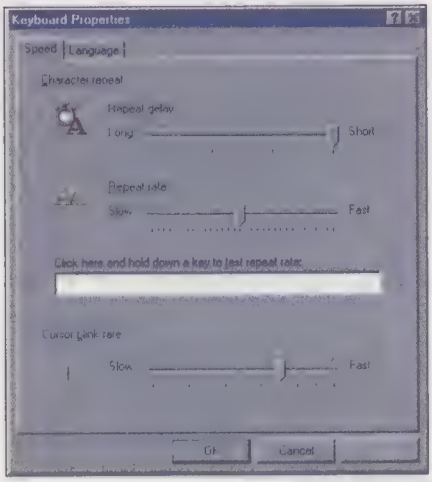
(NOTE: Neither WinNT nor Win2000 offers a browse command to add screen savers to the options window as they do with wallpaper. Instead, custom screen savers automatically appear in the Screen Saver selection box after installation. If you don't see them, try copying them to the folder where system screen savers are stored. In WinNT, this is C:\WINNT; in Win2000, it is C:\WINNT\SYSTEM32.)

Customize The Keyboard

Win9x. You can customize keyboard options by clicking Start, selecting Settings, clicking Control Panel, and then double-clicking Keyboard. The Keyboard Properties window has two tabs in Win98 and three in Win95. (Because this third tab, General, only shows what type of keyboard you're using, we'll ignore it here.) On the Speed tab, you can configure your repeat delay and repeat rates. Repeat delay is the amount of time you can hold down a key before it begins to repeat. Repeat rate is the speed at which the keystroke is repeated when you hold down that key. You can test the repeat rate in the provided entry field. On the Speed tab you can also set your cursor blink rate so you can see your cursor easily without it being annoying.

The Language tab lets you install keyboard settings for different languages, which lets you use languages that require different character sets. If you don't see the language you want to use, you'll need your Win9x installation CD-ROM so you can install them.

By clicking the Properties button on the Language tab, you can rearrange your keyboard layout, changing it from the usual QWERTY layout (so named because of the first six letters in the top-left row of a standard keyboard) to another style, such as Dvorak (a layout that situates all vowels and punctuation marks on the left side of the keyboard and consonants on the right side). If you decide to switch to a Dvorak layout, you'll have to buy a Dvorak keyboard or pry all the keycaps off your present QWERTY keyboard and rearrange them in a Dvorak layout. So, don't change your keyboard layout unless you're certain of what you're doing. It may be very hard to change it back when you're not sure what you're typing.



If you're having trouble keeping up with your cursor, adjust the blink and repeat rates in the Control Panel's Keyboard applet.

WinNT and Win2000. To customize your keyboard, click Start and choose Settings, Control Panel, Keyboard. You'll see three tabs: Speed, Input Locales, and General (Hardware in Win2000). The Input Locales and General (Hardware) tabs are used to establish keyboard settings, such as the type of keyboard you are using; you should not alter these settings.

Click the Speed tab to view its contents. On this tab, you can configure your repeat delay and repeat rates. Repeat delay is the amount of time you can hold down a key before it begins to repeat. Repeat rate is the speed at which the keystroke is repeated when you hold down that key. You can test the repeat rate in the provided entry field.

Next, choose a cursor blink rate. This is the speed at which the cursor or insertion point blinks. Drag the slider to the right to make the cursor blink faster; slide it to the left to slow it down.

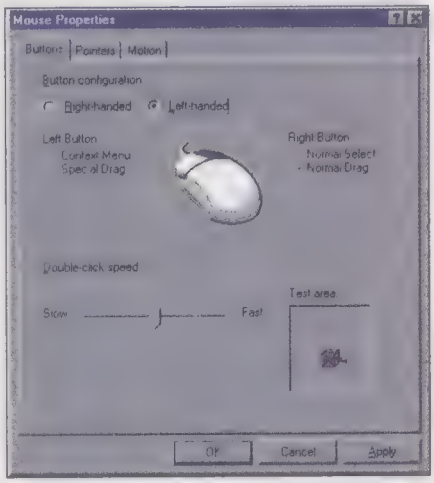
As an added bonus in all four Windows operating systems, you can set up shortcut keystrokes to open programs. Locate the program's shortcut in the Start menu's Programs folder or find it on your Desktop. Right-click the program's icon and select Properties from the resulting pop-up menu. Click the Shortcut tab and enter a shortcut keystroke combination; for example, you might use ALT-I for Internet Explorer.

Be aware that shortcut keys, like icons, can only be changed through the Shortcut Properties tab, which only appears with shortcuts. If you don't see a Shortcut tab, then you have right-clicked the actual program option, rather than the shortcut for the program. To create a shortcut, right-click the icon and select Create Shortcut from the pop-up menu. The shortcut will appear in the same location as the program icon (in the Programs menu or on the Desktop). You can now set up a shortcut keystroke.

Customize The Mouse

Win9x. Click Start, select Settings, click Control Panel, and then double-click Mouse to set certain mouse properties. The available properties will vary depending on which mouse, trackball, or other input device you have attached to your computer, but you should have three common tabs: Buttons, Pointers, and Motion.

Are you a left-hander tired of living in a right-handed computer user's world? On the Buttons tab, you can change your mouse orientation from right- to left-handed by clicking the appropriate radio button; the descriptions of what the right and left mouse buttons do flip according to your choice. In addition, you can select your double-click speed by moving the slider in the bottom portion of the window. If you have more than one button on your mouse, you may be able to reassign functions to your buttons in this menu. And, if you have a three-button or scrolling mouse, you can set the size and speed of window scrolling here.



If your right-handed mouse is giving southpaws fits, change the button orientation in the Control Panel's Mouse applet.

The Pointers tab lets you customize your mouse pointers. Depending on your individual setup, you may find a variety of pointer schemes. A couple you're bound to see are the Animated Hourglass and Windows Standard. Finally, you can use the Motion tab to configure how fast your pointer moves or if your pointer leaves a trail. This feature is helpful for people who have trouble following the arrow around on-screen.

WinNT and Win2000. To customize your mouse, click the Start button and select Settings, Control Panel, Mouse to open the mouse properties. You'll see four tabs: Buttons, Pointers, Motion, and General (Hardware in Win2000). Use the first three tabs to set WinNT and Win2000's mouse-customization options. The General (Hardware) tab identifies the type of mouse you're using and does not offer any customization features.

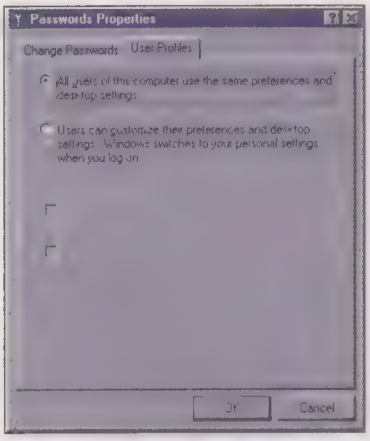
On the Buttons tab, you can use the appropriate radio buttons to change your mouse orientation from right- to left-handed. In addition, you can select your double-click speed by moving the slider in the bottom portion of the window. Win2000 adds an option to choose whether items will open with a single-click or a double-click. To set this up, select the radio buttons in the Files And Folders section of the Mouse Properties window.

The Pointers tab lets you customize your mouse pointers and other icons, such as the hourglass graphic that appears when you are waiting for a command to execute. Both operating systems offer a variety of pointer schemes. For example, the Old Fashioned scheme uses a running horse instead of the hourglass. You can also alter the custom schemes and save them as new schemes.

The Motion tab has a slider that determines how fast your pointer moves. Additionally, here you can configure whether or not your mouse uses the "snap to" feature. With this enabled, the pointer will automatically jump to the default button (such as Close or OK) in dialog boxes. Win2000 also lets you decide how much your mouse accelerates as you move it; you can choose among None, Low, Medium, or High.

Set Passwords

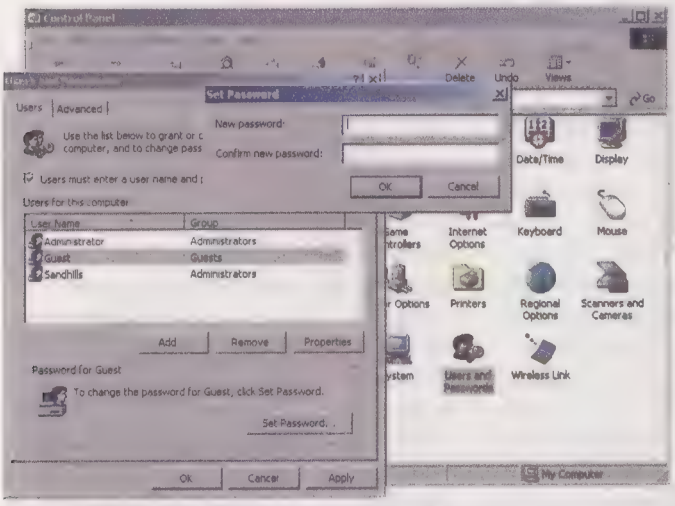
Win9x. You can customize either Win95 or Win98 for more than one user if several people use one computer and want to have their own color schemes, Desktop


Passwords Properties
Change Passwords
User Profiles
All users of this computer use the same preferences and desktop settings
Users can customize their preferences and desktop settings. Windows switches to your personal settings when you log on
OK
Cancel

If you're using Win9x, you can use the Password Properties' User Profiles tab to set up different user preferences for individual users.

The User Profiles tab lets you set up Win9x with different options for different users. The options can be as simple as wallpaper or can be more complex, such as display properties or keyboard layouts. You also can choose for all users to have the same settings if that is what you want. If you allow users to have different settings, you can choose here whether those settings include customization of the Start menu and program groups. In order to change system configurations, you'll need to log off one user using the Log Off option in the Start menu. Then, log on as a new user, and the changes you make will be assigned to the new user.

When you upgrade from Win95 to Win98, you may find that your customized keyboard and mouse preferences do not carry over. This is because the Win98 installation only considers the default user when you install the operating system. You will have to reset your keyboard and mouse preferences for your new profile after you have finished your upgrade.



Win2000 has made setting up passwords easier. Simply select a guest and click the Set Password button.

WinNT. WinNT allows users at certain access levels to establish passwords for themselves and other users. These do not control access to specific programs or features; they simply control access to that particular user's settings.

For example, if the administrator wants Jane to have access to Microsoft Excel but does not want John to use it, he or she will create a password-protected profile for each person with the designated access restrictions, rather than restricting the program through passwords and then giving the password only to authorized users.

To set passwords in WinNT, click Start and select Programs, Administrative Tools, and then User Manager. To set passwords for an existing user, open the User menu and select Properties. To establish a new user and password, choose New User from the same menu. The Account option under the Policies menu allows the administrator to set password constraints, such as the number of days before the user must change a password.

Win2000. Win2000 has simplified the password-protection feature and moved it to the Control Panel. To create passwords and add or delete users from the system, click Start and select Settings, Control Panel, and Users And Passwords. To add or change a password for a user (which is called a guest in Win2000), select a guest and click Set Password. Enter the password you want to assign and then type it again to confirm it.

configuration, or accessibility options enabled. You can also set up a password for different user profiles so each person can only access or change his or her own setup.

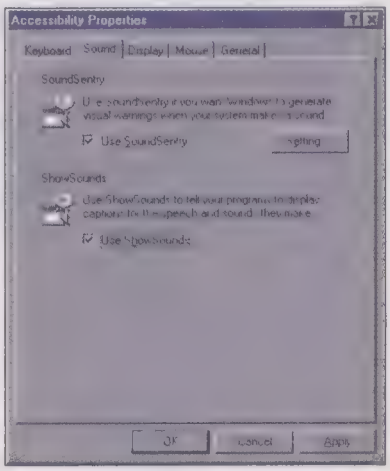
To get to these functions, click the Start button, select Settings, click Control Panel, and then double-click Passwords. The Passwords Properties window has two tabs, one for changing passwords and one for setting up user profiles.

Setting a password is simple enough; just click the Change Windows Password button and type in the password as prompted. If a password is already set up, you'll have to enter that password in order to change to a new one. From the Change Passwords tab, you can also change the passwords for other protected services if there are any set up in Windows.

Use Accessibility Options

Win9x. Win95 and Win98 provide for a wide array of different options that allow people with different physical needs to use the computer more comfortably. You can find these options by clicking the Start button, selecting Settings, clicking Control Panel, and then double-clicking Accessibility Options.

The Accessibility Properties window has five tabs. Click the Keyboard tab to configure options that will help you use your keyboard. StickyKeys allows you to press combination keystrokes (such as CTRL-ALT-DEL) in succession, rather than having to press the first key, hold it down, and then press the remaining key or keys. FilterKeys instructs Windows to ignore brief or repeated keystrokes or to ignore the repeat rate. Finally, when you turn on ToggleKeys, Win9x will make sounds when you press the CAPS LOCK, NUM LOCK, or SCROLL LOCK keys.

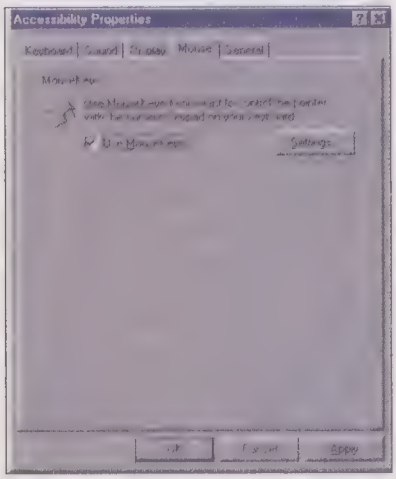


If you have trouble hearing, open the Accessibility Properties and turn on SoundSentry and ShowSounds.

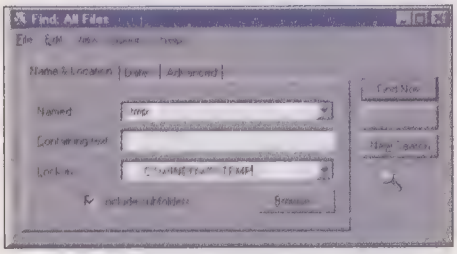
SoundSentry on the Sound tab contains options for setting up visual events, such as flashing Window bars, to take the place of Win9x's default sounds. Use the Settings button to choose which get these flashing events. You also can turn on the ShowSounds option to have Win9x show you textual captions or informative icons for events that it usually conveys through sounds.

The Display tab lets you set your video display to show high-contrast color schemes (such as black on white), which can make the computer screen easier to read. The Settings button lets you assign a hotkey of your choice to turn on the high-contrast settings, and you can even decide which high-contrast scheme to use.

The Mouse tab lets you turn on MouseKeys, which lets you use your numeric keypad rather than your mouse to control your cursor. The Settings options here let you assign a hotkey combination to turn on MouseKeys and also let you configure how fast the pointer moves when you hold down a MouseKey direction key (such as the 8 key for the Up arrow or the 6 for the Right arrow) and how fast the mouse pointer speeds up to its maximum speed when you hold down a directional key.



Enable MouseKeys in the Accessibilities Properties window to use the numeric keypad instead of the mouse.



Use the Start menu's Find: All Files tool to rid your Win9x system of unnecessary temporary files that could be hogging hard drive space.

The General tab lets you set a time-out for the accessibility options. You can instruct Win9x to turn off the accessibility options if your computer is idle for a specified amount of time. You also can make Win9x give a warning sound or message before turning off the accessibility options. Finally, from this tab you can set up support for alternative serial devices if you cannot use the mouse or keyboard at all.

WinNT. The Accessibility Options feature offers enhancements for the physically challenged, such as visual clues for the hearing-impaired, as well as alterations you can make to standard options to slow down certain functions to a more manageable level. To configure Accessibility options, click Start and select Settings, Control Panel, Accessibility Options. You'll see a window with four tabs: Keyboard, Sound, Mouse, and General; you can enable most of the following features by using your mouse to place a check mark in a checkbox.

Click the Keyboard tab to get help inputting text and other commands. StickyKeys lets you press combination keystrokes (such as CTRL-ALT-DEL) in succession, rather than all at once. Once you press the first key, it stays "on" until you press the next key in the combination. FilterKeys instructs Windows to ignore brief or repeated keystrokes or to ignore the repeat rate. Finally, when ToggleKeys is activated, you'll hear sounds when you press the CAPS LOCK, NUM LOCK, or SCROLL LOCK keys.

If you have trouble hearing, you can make adjustments on the Sound tab to help you keep up with what your operating system is doing. First, you can turn on SoundSentry to have Windows generate visual warnings when system sounds occur. Second, you can activate ShowSounds to have your programs display captions for the speech and sounds they make.

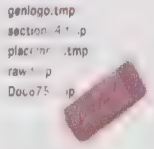
Click the Mouse tab to enable MouseKeys. This option lets you set up your numeric keyboard to control the mouse pointer.

A host of other accessibility features are housed on the General tab. First, you can activate Automatic Reset to turn off accessibility features if they are not used in a specified amount of time. Second, you can use the Notification feature to have Windows issue a sound when an accessibility feature is turned on or off. Finally, you can configure SerialKey devices to set up auxiliary access to keyboard and mouse features.

Most accessibility features also have a Settings option. These control the shortcut keys for the feature, and some support other modifications, such as speed control.

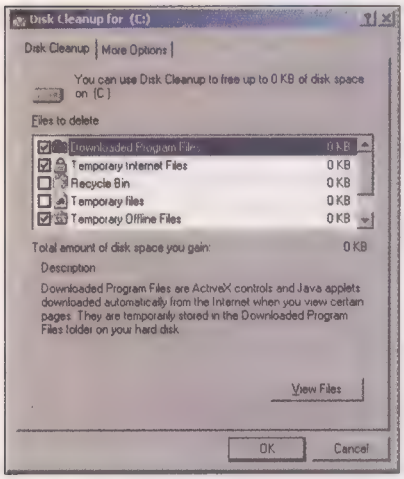
Win2000. The accessibility features in Win2000 are identical to WinNT's, with the addition of two enhancements. Win2000 has added a Display tab to allow users to automatically select colors and fonts that are designed for easier reading. Also, the General tab now provides administrative options to set accessibility features for both the default desktop logon and new users.

Delete TEMP Files



Win9x. TEMP (temporary) files are bits and pieces that have been left behind from software or hardware installations that are no longer useful. Deleting TEMP files is a maintenance function that you can perform yourself in either operating system or one that you can set up to have Win98 do for you through the Maintenance Wizard. In Win9x, you can find TEMP files by clicking the Start button and selecting Find, Files Or Folders. In the Named field, type ***.tmp**; next, move down to the Look In field and type **C:\WINDOWS\TEMP**, and then click the Find Now button. In the bottom part of the window you'll see a listing of all the TEMP files in this directory. You can delete these as you would delete any file.

Win98 comes with a utility called the Maintenance Wizard, which makes adjustment to your computer so you get the best performance from it. The Maintenance Wizard sets three basic tasks, which help keep your hard drive working efficiently and well, to run on a regular schedule: ScanDisk, Disk Defragmenter, and the more general task of deleting old and useless files including the TEMP files that we are interested in here. To access the Maintenance Wizard, click Start; select Programs, Accessories, System Tools; and then click Maintenance Wizard. The Maintenance Wizard will open and walk you through the steps of setting it up. If this is your first time using the Maintenance Wizard, you may want to select Express in the first window. This option configures Maintenance Wizard to perform the most common maintenance settings.


Disk Cleanup for (C:)
Disk Cleanup | More Options |
You can use Disk Cleanup to free up to 0 KB of disk space on (C:)
Files to delete
Downloaded Program Files 0 KB
Temporary Internet Files 0 KB
Recycle Bin 0 KB
Temporary files 0 KB
Temporary Offline Files 0 KB
Total amount of disk space you gain: 0 KB
Description
Downloaded Program Files are ActiveX controls and Java applets downloaded automatically from the Internet when you view certain pages. They are temporarily stored in the Downloaded Program Files folder on your hard disk.
View Files
OK
Cancel

You can use Win2000's Disk Cleanup tool to automate the process of deleting temporary files so you don't erase anything important.

From here, you'll have to schedule a time for Maintenance Wizard to run; your best bet is to run it late at night or at another time when you won't need to use the computer. You will have to leave the computer running for Maintenance Wizard to work. The next window shows you which tasks Maintenance Wizard will perform, including the deletion of unnecessary TEMP files. Once you click Finish, your computer is on schedule for maintenance.

WinNT. To delete TEMP files, click the Start button, select Programs, and open Windows NT Explorer. Open the Tools menu and select Find, Files Or Folders. In the Named field, enter ***.tmp**. Next, move down to the Look In field, type **C:\TEMP**, and click Find Now. This will return all the temporary files located in the temporary folder.

The system may still be using any .TMP files with today's date, but all others should be safe to delete. Highlight them with your mouse and press DEL. WinNT will move the files to the Recycle Bin, where you can then permanently delete them from the system.

Win2000. Win2000 has automated the process of removing unneeded TEMP files, thereby reducing the chance that you'll accidentally delete necessary files. To remove extra temporary files and perform other housekeeping operations, such as emptying the Recycle Bin and removing installed programs that you no longer use, run the Windows 2000 Disk Cleanup Wizard. To start Disk Cleanup, click the Start button, select Run, type **cleanmgr** in the Open field, and click OK.

Set Up A Printer

Win9x. Setting up a printer for the first time can be a little confusing. Win9x looks to ease some of your printing pain by offering the Printers window. You can access this window through the Control Panel, or you can simply click the Start button, point at Settings, and then click Printers. When the Printers window opens, you will see an icon labeled Add New Printer, as well as icons for any printers that are already installed on your system or network.

Double-clicking Add New Printer will open up the Add Printer Wizard. Click Next, and then choose whether this is a local printer (attached directly to your computer) or a Network printer. If it is a Network Printer, speak with your system administrator to make sure you know the correct path to your printer.

In the next window, choose your printer's manufacturer and model so Win9x can check to see if it has a driver for it. If your printer's documentation instructs you to use driver software provided with the printer, click the Have Disk button and follow the prompts to install this software. Next, check which port the printer is attached to and tell Windows whether this printer is now your default printer (the one that is used unless you tell Windows to specifically switch to some other printer).

If you right-click an icon for a certain printer, you can access the printer's Properties menu. The options available in this menu will vary depending on the printer you use, but these commonly include such things as print resolution, image handling, paper sizes, fonts, etc. Check the technical manuals for your printer for details about your printer's properties.

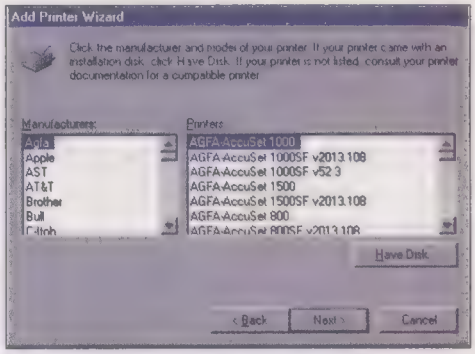
WinNT and Win2000. Before you begin, check your printer's documentation to see if you need to install a special printer driver or if you can use one of Windows' standard drivers. If you need to install a special one, a disk should have come with the printer. If you can use one of the drivers included with WinNT or Win2000, you'll probably need the installation CD-ROM.

To add a new printer, click the Start button and select Settings, Printers. Once the Printers window opens, double-click the Add Printer icon to start the Add Printer Wizard. If you are not on a network, click the My Computer (Local Printer in Win2000) radio button. If you are using Win2000, make sure the option to automatically detect Plug-and-Play printers is selected and click Next.

If you are using Win2000, and the printer is Plug and Play, Win2000 will complete the installation. If the printer is not Plug and Play, the process is identical to the following WinNT instructions.

(NOTE: Network users will select the Network Printer radio button. You should set up new network printers through Network Neighborhood rather than through the Add Printers Wizard.)

A list with all available ports will appear, so select the printer port to use for the printer. The printer will go to the first available checked port, which should be the port into which the printer is plugged. Refer to your printer's documentation to see which type of port it requires. The most commonly used port for printers is LPT1, which is the first parallel port. (Presently, WinNT does not provide support for USB ports but Win2000 does.)



The Add New Printer Wizard makes it easy to set up a new printer and find the correct drivers.

After you check the appropriate port, click Next, and a list of printer manufacturers will appear. If you need to install a special driver, click Have Disk. Insert the CD or diskette that contains the printer software and click Next.

.Your printer's name will appear in the Printer Name field, and you can change this name if you want. If you want to set the printer to be your default (main) printer, click Yes. If networking is installed, the operating system will ask you if you want to share this printer. Do not enable this option unless the printer is set up on a network. If it is shared, choose a name for the printer and identify the operating systems that will be used on shared systems. Click Next.

At this point, WinNT and Win2000 ask if you would like to print a test page. Click Yes and then Finish. A test page should print, and your new printer will now appear in the Printers window. LS

by Jennifer Farwell and Jennifer Powell

Working With Windows Components

If you've been hankering to take a full-fledged spin around the Windows electronic block, look no further. Getting around and using the features in Windows 95, Windows 98, Windows NT, and Windows 2000 is a breeze.

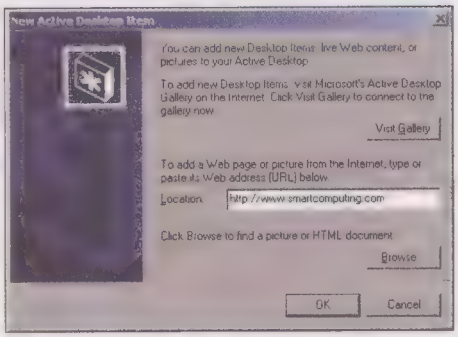
In this article, we'll let you test drive the main features in these heavy-duty operating systems and point out a few of the differences between them. But most likely, you'll notice the similarity of these operating systems more than their differences. Don't be surprised if the instructions and features in these operating systems are almost identical. So fasten your safety belt, grab your mouse, and come along for a quick-paced ride.

(*NOTE: Many of the features we discuss for one or two operating systems will also work in the other two Windows versions. However, some of the features will work only in one of the operating systems.*)

Active Desktop/Channels

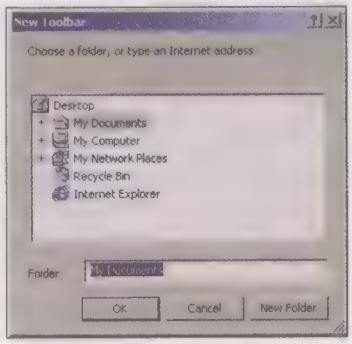
WinNT and Win2000. The most logical first stop on our tour is also the most evident: the Windows Desktop. In Win2000, you can either display the Desktop as the traditional Windows Classic or as an Active Desktop. The Active Desktop integrates Web features, such as the ability to display live content from the Web on your screen. For example, perhaps you want to keep abreast of the latest news or stock market figures. When you use the Active Desktop, you can create an item (a channel) that shows the Web information on a minute-by-minute basis. (*NOTE: If you have Internet Explorer (IE) 5.0 installed on your WinNT machine, you can access some of the Active Desktop features, as well.*)

To turn on the Active Desktop in Win2000, right-click a blank area of the Desktop, click Active Desktop and then check the Show Web Content. After you launch this flavor of the Desktop, you can add Web content to it. Right-click a blank space on the Desktop to display a pop-up menu, choose Active Desktop, and then click New Desktop Item. Enter the address for the Web site from which you want to pull live information in the Location field and then click the OK button.


New Active Desktop Item
You can add new Desktop items, live Web content, or pictures to your Active Desktop.
To add new Desktop items, visit Microsoft's Active Desktop Gallery on the Internet. Click Visit Gallery to connect to the gallery now.
Visit Gallery...
To add a Web page or picture from the Internet, type or paste its Web address (URL) below:
Location:
http://www.smartcomputing.com
Click Browse to find a picture or HTML document.
Browse...
OK
Cancel

You can easily add Web items to your Win2000 Desktop; just enter the address for the Web site from which you want to pull live information in the New Active Desktop Item window.

To make sure the latest and greatest data displays, right-click the Desktop again, click Active Desktop, and then select Synchronize. To temporarily turn off the display of an item, click the Close button that displays in the upper-right corner of each item's window. To completely delete the item, right-click the Desktop, choose Properties from the pop-up menu, and then click the Web tab. Select the item you want to get rid of and click the Delete command. Choose Yes to confirm your action and then close the Properties dialog box.



To create a new Win2000 toolbar on your Taskbar, designate a folder in the New Toolbar dialog box, and the associated buttons appear on the Taskbar.

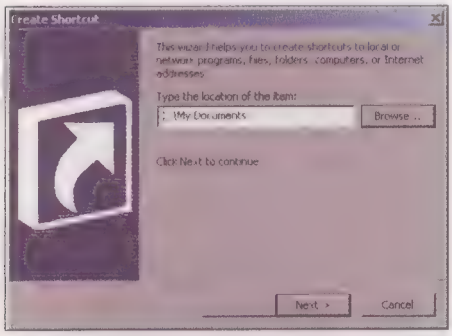
If you want to turn off the entire Active Desktop feature in Win2000 and redisplay the Windows Classic Desktop, right-click the Desktop, click Active Desktop, and clear the check mark for Show Web Content.

Another component on your Desktop, the Start menu, automatically figures out which programs you most frequently use and then shows only those items on its short menu. If you want to instead view the complete spectrum of programs available on your system, simply click the down-pointing arrows (chevrons) to see the full menu. If Win2000's uncanny ability to track which programs you're using unsettles you, turn off this feature by choosing the Start button, Settings, Taskbar & Start Menu and then the General tab. Deselect Use Personalized Menus before clicking OK.

You can exert even more control over which items appear on the Start menu by customizing it. For example, you can add, delete, or rearrange items on the menu, such as adding a shortcut to a folder or file you use on a regular basis in WinNT and Win2000. To individualize the Start menu in Win2000, click the Start button, Settings, and then the Taskbar & Start Menu command. Click the Advanced tab, click Add and then work through the Create Shortcut Wizard screens. In WinNT, the process is similar. Choose the Start button, Settings, Taskbar, and then click the Start Menu Programs tab. Click the Add button and then make choices on the pages in the Create Shortcut dialog box.

In either version of Windows, you can add an item to the Start menu by dragging it from the Desktop (or a window) to the Start button. For example, you can click and drag the Internet Explorer icon from the Desktop to the Start button and then release the mouse. Click the Start button and the Internet Explorer icon appears in the menu. To remove the item from the Start menu, click the Start menu, Settings, and then Taskbar (or Taskbar & Start Menu in Win2000). Then, click the Start Menu Programs tab (the Advanced tab in Win2000) and click Remove. In the Remove Shortcuts/Folders dialog box, select the item and click Remove.

Win2000 also hands you additional choices by allowing you to customize the buttons that appear on your Taskbar. It's easy to quickly add different buttons to your toolbar by choosing one of the built-in toolbars supplied by Windows. For example, you can activate the Desktop toolbar so items that normally appear on your Desktop, such as the My Computer icon, are also available as Taskbar buttons. To do this, right-click a blank spot on the Taskbar and choose Toolbars and then Desktop.


Create Shortcut
This wizard helps you to create shortcuts to local or network programs, files, folders, computers, or Internet addresses.
Type the location of the item:
My Documents
Browse ...
Click Next to continue
Next >
Cancel

In Win2000, you can easily add items, such as folders and files, to your Start menu using the Taskbar & Start Menu Properties dialog box.

Win2000 also automatically places the Quick Launch toolbar on your Taskbar in the space between the Start button and the running-programs icons. To choose a different toolbar, right-click a blank spot on the Taskbar and then choose the toolbar you want from the (what else?) Toolbars submenu. To turn off the toolbar's display, repeat the process.

In addition to the built-in toolbars in Win2000, you can display a toolbar of your choice on the Taskbar. Windows is pretty flexible in how it defines a toolbar, too. It can be a document, folder, or a Web site. For example, you might want quick and easy access to the files in the MY DOCUMENTS folder. When you do, Windows creates a handy button for each object within the folder (in this case, usually subfolders or files) and places it on the Taskbar. To quickly display the object, such as the contents of a folder, you can then click the associated Taskbar button. If there are too many objects for Windows to represent each with a button, Windows places them on a menu you can display by clicking the More Buttons button at the right end of the Taskbar.

To make your own custom toolbar, right-click a blank area on the Taskbar, click Toolbars, and then select New Toolbar. In the New Toolbar dialog box, choose a document or folder or designate a Web address. You can either type in the Web address or choose it from your FAVORITES folder. You also can browse the objects represented in the middle of the New Toolbar dialog box. Click OK to close the dialog box and automatically display your new toolbar.

To close the toolbar, right-click a blank area on the Taskbar and choose Close to display the Confirm Toolbar Close dialog box. If a message box displays, confirm your action by choosing OK.

Win9x. Active Desktop, which was introduced with *IE4*, appears to be scaled back in Win98 Second Edition and IE5. (*NOTE: Some IE4 users may need to manually install the Active Desktop feature. Select the Start button, Settings, Control Panel, and then open Add/Remove programs. From the Install/Uninstall tab, select IE4 and then click the Add/Remove button. Select Add The Windows Desktop Update component from the Web site and then click OK. Follow the on-screen instructions to complete the Active Desktop installation.*)

There are fewer prepackaged Active Desktop elements available from the Microsoft Web site, but you can still manually add Web content to your Active Desktop. First, make sure your computer is configured to support Active Desktop by right-clicking a blank area of your Desktop and selecting Active Desktop and then View As Web Page. Open the Web page that contains the item you want to add; it can be a map, a picture, and even the entire page. Right-click the item or, to add an entire Web page, right-click a blank area of the page. (Many Web pages use a background picture so there may not be a blank area. In that case, you will end up putting only the background picture on your Desktop.) From the pop-up menu, select Set As Desktop Item. Look carefully at the URL (universal resource locator) of the item in the Add Item To Active Desktop dialog box. You may discover you clicked the wrong item, or you weren't in a blank area of the Web page. If the URL looks correct, click OK to add the item to your Desktop.

There are two ways to remove Web items from your Desktop: You can hide them or you can delete them. To close or hide an Active Desktop item, click the item's close button. This removes the item from the Active Desktop, but it doesn't delete it; you can redisplay this item at a later date. To delete an item or make a closed item reappear, right-click a blank area of your Desktop and choose Properties from the pop-up menu. Select the Web tab, and you will find a list of Web elements available for use on the Active Desktop. Items with a check mark are presently visible on the Desktop. Place a check mark next to an item to make it visible or remove the check mark to close the item. Select an item and click Delete to permanently remove the item.

custom
update
AAPL 139.13 -0.44
Dow 10936.11 -89.74
S&P500 1507.73 -16.13
Consumer confidence drops in March
Efficient Networks to buy NetSc
Quotes supplied by Standard & Poor's Comstock, Inc. and delayed at least 20 minutes IMPORTANT: copyright

The Active Desktop Channel Bar in Win98 provides fast access to selected Web sites, as well as the ability to download updated Web content at scheduled intervals.

Active Desktop includes the Channel Bar, which is a list of Web sites with corresponding buttons on your Desktop. Clicking a button opens the associated Web site. The Channel Bar is more than just a quick way to access Web sites; it also allows you to subscribe to certain Web sites and download their content to your computer at scheduled intervals. By downloading a Web page before viewing it, you gain fast access to its contents. This is especially helpful for those of us who still have slower Internet connections. Schedule the download of your subscribed sites for the wee hours of the morning, and they'll be available to you while you sip your morning coffee.

You can synchronize downloaded Web sites to ensure they are current with the host site by opening IE5 and selecting Synchronize from the Tools menu. To

control when sites are updated, click the Setup button. Choose whether to synchronize sites when you first log on, when your computer is idle, or at predefined times specified by the host site. If you want to create your own schedule, select a site from the list, click the Properties button, and then select the Schedule tab. The host site's default schedule will display. To create your own schedule, click the Add button. Specify how often you want the site to be updated and whether your computer should automatically connect to the Internet if needed. Click OK to save the new schedule. If you want to update a site more than once a day, you will need to add additional schedules. Click the Add button and specify a new time for the update. Click OK and then make sure all your schedules have a check mark in the schedule list. Click Apply to save the changes and then click OK to dismiss the dialog box.

Channels are also available from within IE. Select Channels from the Favorites menu to see the list of channels.

My Computer

WinNT and Win2000. In both Win2000 and WinNT, you'll find familiar Desktop icons, such as My Computer and the Recycle Bin. Furthermore, double-click the My Computer icon on your Desktop, and you'll see the same basic choices you've grown to know and love in Win9x, including icons for each main drive on your computer and an icon for the Control Panel. To display properties, such as the amount of free space, for a drive, right-click the icon and choose Properties. To view the files associated with each drive, double-click the drive's icon.

You'll probably find yourself reaching for the Control Panel icon within the My Computer window. Just like in previous versions of Windows, the Control Panel is Win2000's and WinNT's command center for regulating settings and controlling how your system operates. You can use items in the Control Panel to manage just about anything, including mouse speed and which users can add or delete programs. Because the Control Panel is key to tweaking your system, we'll spend a couple of moments looking over some of its options. Keep in mind the choices included in the Control Panel window vary a bit between WinNT and Win2000. For example, Win2000 sports a new Folder Options icon packed full of choices about managing your file system.

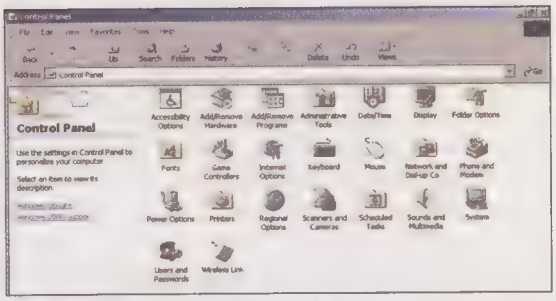
The Accessibility Options in both versions of Windows help you change how your hardware operates so it better accommodates those with mobility, sight, or hearing limitations. For example, you can turn on StickyKeys if you want to use SHIFT, CTRL, or ALT by pressing the keys one at a time. You also can use the Display tab of the Accessibility Options dialog box in Win2000 to make your screen high contrast.

The Add/Remove Programs feature in Win2000 is similar to the one used in Win9x and WinNT. However, the Add/Remove Programs window has more useful information than in the past, including the last time you used a program. For example, you can sort the programs on your system by Name, Size, or Frequency Of Use. To do this, choose the option you want from the Sort By list.

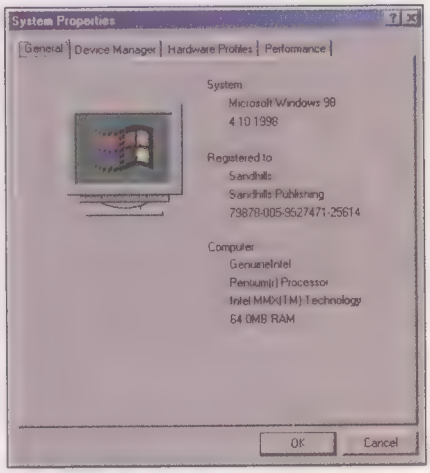
Finally, you can set up other users by double-clicking the Users And Passwords icon in Win2000's Control Panel, which you can access by clicking the Start button, Settings, and then Control Panel. (This also works great if you are operating on a home system and want to allow another user access to your computer but not to your private files.) Click the Add button, assign a new user name, and then click Next. On subsequent screens, assign (and confirm) a password for the user, as well as the security level. When you finish, choose Finish and then OK.

If you're the all-powerful administrator, you can restrict user privileges through the same dialog box.

Win9x. My Computer may be the most prominent icon on your Desktop. Sitting in its default location at the top-left corner of the Desktop, it's one of the first icons you see when your system boots. My Computer is a quick way to get to the root level of your computer. Double-click the My Computer icon on your Desktop, and you'll see an icon for the hard drive, diskette drive, CD-ROM drive, and any removable drive on your computer, as well as an assortment of folders containing tools for configuring how your computer works. My Computer displays the contents of each drive or folder you open; all your computer's resources are available by browsing or drilling down through the file hierarchy.



Win2000 sports some new features in the Control Panel. For example, the Folder Options icon is new.



My Computer can give you quick access to your System Properties, which will tell you how your system is configured.

Navigating the hierarchy can be a bit tricky. Fortunately, Microsoft has added a few navigation aids to make it simpler to navigate. (*NOTE: Some navigation features aren't available to Win95 users. However, if you install IE4 with the Active Desktop option or IE5, you will have access to most of the latest features. IE updates are available at the Microsoft Web site at http://www.microsoft.com/windows.ie.*)

You can move quickly to the parent folder (the one containing the folder you're presently viewing) by pressing the BACKSPACE key. Make sure you don't have any icons or text selected, or you may delete the highlighted item or items when you press the BACKSPACE key. You also can back up by clicking the Back button or the Up button in the standard, browser-like toolbar, if visible. The Address bar is another way to quickly jump to a location on your computer. Click the down arrow at the end of the Address bar to display a drop-down list of destinations.

If your Address bar isn't available, don't worry; not all toolbars are present all the time. You can choose which ones are visible by selecting the Toolbars command from the

View menu. A check mark next to the name of a toolbar means that toolbar is visible; unchecked toolbars are invisible. Click a toolbar name to alternate between visible and invisible.

My Computer also can give you quick access to your System Properties. The usual way to access System Properties is to use the Start menu and select Settings, Control Panel, and then System. You can get there much faster by simply right-clicking the My Computer icon on your Desktop and then choosing Properties from the pop-up menu. The System control panel is a great place to see how your computer is configured. Select the General tab to see the amount of physical RAM installed on your computer, the type of processor you have and the version of Windows you are using. The Performance tab displays the percentage of free system resources, as well as some of the advanced options you can set for your file system, graphics, and virtual memory. For example, if your computer seems to take a long time to boot with Win98, it may be searching for connected diskette drives every time it starts. Unless you're using a notebook, you probably don't connect and disconnect diskette drives so you can instruct your computer not to search for them at every boot. Under the Performance tab, click the File System button and then select the Floppy Disk tab. Uncheck the Search For New Floppy Disk Drives Each Time Your Computer Starts box. Click Apply to save your changes and then click OK to dismiss the dialog box.

My Documents

Win2000. WinNT doesn't have a MY DOCUMENTSS folder, but Win2000 does. This is just a folder where you can easily save documents, photos, and other types of files. This is the default folder for Win2000 when you save a file. The folder also contains the MY PICTURES folder. This is the default location for saving photos from you digital camera.

If there is more than one person using your computer, you don't have to worry about sharing the MY DOCUMENTS folder with the other users. Each person has his or her own folder. This means you also can easily customize your folder. To do so, click Customize This Folder from the View menu.

Win9x. The My Documents icon is actually a shortcut to the folder located at C:\MY DOCUMENTS. If your Desktop is missing the My Documents icon, you can create a shortcut to the folder by opening My Computer and then opening the C drive. Locate the MY DOCUMENTS folder, right-click it, and drag the icon to your Desktop. When you release the mouse, select Create Shortcut(s) Here from the pop-up menu. Many Windows applications use this folder as the default location for storing saved documents, which is especially convenient for backups. Documents are usually your most important files because you can more easily restore program files from the original CDs or diskettes. Keeping documents in one place means you don't have to search through various locations on your computer when you back up files.

The MY DOCUMENTS folder is also easy to access from the Start menu. Select the Start menu, Documents, and My Documents. This access path is handy when your Desktop is not visible because of numerous open windows.

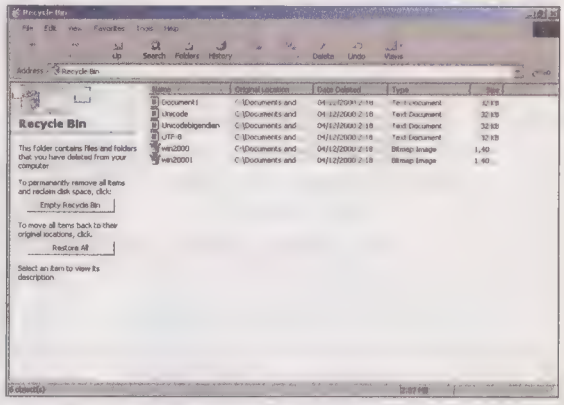
Recycle Bin

WinNT and Win2000. The Recycle Bin is the electronic version of your office trashcan. When you delete a file from your computer's hard drive or network, you are only moving the file to the Recycle Bin. To completely rid yourself of the file, you need to empty the Bin (just as you get rid of paper files when you empty the trash).

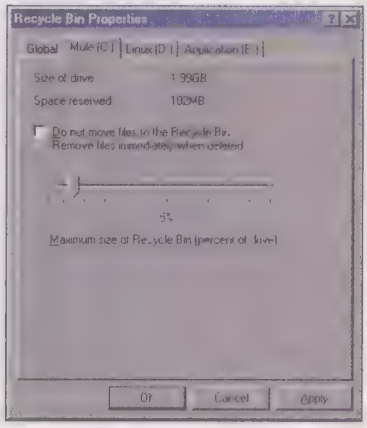
To see the present contents of the Recycle Bin, double-click its icon on the Desktop. If you spy a file you want to return to its original location, select it and then click the Restore button (or choose Restore from the File menu in WinNT). To quickly move all the files back to their previous location in Win2000, click the Restore All button. Finally, you can choose the Empty Recycle Bin command in the File menu (of both versions) to permanently delete the listed files.

You can more effectively work with the Recycle Bin if you display the Recycle Bin's buttons and toolbars in Win2000. To do this, choose the View menu, Toolbars, and then Standard Buttons. After you display this toolbar, you can choose various ways of displaying the list of files in Win2000 by clicking the Views button, which brings up a drop-down menu. Then, you can choose an option, such as List or Details. (In WinNT, you can change the way files display by choosing an option from the View menu.)

If you are displaying the files in Details view with columns for Name, Original Location, Date Deleted, Type, and so on in either version of Windows, keep these handy hints in mind: First, you can resize the column width by dragging the column border right or left. Just hold your cursor over the border of the columns until it changes to a double arrow, then click and drag the column border. You also can sort by a column by clicking its column header (the bar in gray at the top of each column). Sort the column in reverse order by clicking it a second time.



The Recycle Bin in Win2000 gives you a few more ways to restore and delete items from the bin: the handy buttons on the left side of the window.



By default, the Recycle Bin in Win9x reserves 10% of your hard drive space. You can free up space by adjusting the Recycle Bin's properties and reducing this percentage.

There are other buttons available on the toolbar, as well. For example, you can select a file and then click the Copy button (the WinNT toolbar also has a Copy button). Click your insertion point in a window to which you want to move the file and then choose Paste. Deleting a file is completely a snap, too. Select the file and then choose the Delete button. Choose Yes to confirm your action.

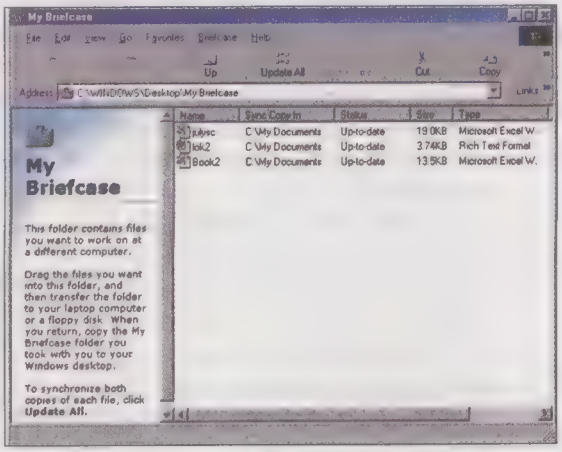
By default, both Win2000 and WinNT will store your deleted files until 10% of the drive has been used for the files. However, if you're the all-powerful administrator for your system, you can tweak the Recycle Bin's settings to use a smaller or larger portion of your drive. To do this, right-click in a blank area in the Recycle Bin window and then choose Properties. On the Global tab, move the slider bar to indicate the percentage of the drive you want to use for stored, deleted files. Click OK.

Additionally, you can use the Properties dialog box to specify that files shouldn't be sent to the Recycle Bin in Win2000 and WinNT. Instead, Windows should toss them away for good when you delete them. To do this check the Do Not Move Files to Recycle Bin box. Finally, you can indicate whether a confirmation dialog box should display when you dump the files. In the Properties dialog box, clear the box for Display Delete Confirmation Dialog Box in Win2000 and the Display Delete Confirmation Dialog in WinNT.

Win9x. When you delete items from your computer, Windows normally sends them to the Recycle Bin. Think of the Recycle Bin as a temporary storage area. Because Windows does not actually erase files from your computer (yet), you can recover the files if you change your mind.

The Recycle Bin is straightforward. You can try out the Recycle Bin by right-clicking a file and selecting Delete from the pop-up menu. A pop-up dialog box will ask if you want to send the file or folder to the Recycle Bin. Click the Yes button, and Windows will move the item from its present location to the Recycle Bin.

Now that you have an item in the Recycle Bin, notice the Recycle Bin's icon has changed from an empty wastebasket to one filled with crumpled papers—a visual clue there are items in the Recycle Bin waiting for you to delete them. If you make an error in deleting an item, you can restore it to its former location by double-clicking the Recycle Bin. A window will open showing you the contents of the Bin. Highlight the item you want to retrieve, open the File menu, and click the Restore command to move the selected item back to its former location. You also can restore an item by right-clicking it and choosing the Restore command from the pop-up menu. If you want to retrieve an item but not restore it to its original location, click the item and drag it from the Recycle Bin to the Desktop.



The My Briefcase feature in Win98 lets you keep files you share between your desktop and notebook computers in sync.

The Recycle Bin is not a bottomless pit; don't rely on it to keep items for any length of time. Once the Bin fills up, Windows permanently deletes the oldest items to make room for newer items. The size of the Recycle Bin is based on a percentage of your hard drive; reducing the Recycle Bin's size can free up needed hard drive space. By default, Microsoft sets the Recycle Bin to 10% of the hard drive, which can add up to quite a bit with today's big hard drives. If you have a 10GB (gigabyte) drive, that's 1GB just for the Recycle Bin. If you have more than one hard drive, each hard drive has its own Recycle Bin, even though you see only one icon on the Desktop.

To adjust the Recycle Bin's size, right-click it and select Properties from the pop-up menu. You should see a Global tab, plus an additional tab for each hard drive, if you have more than one installed. Select the Global tab. You can set the properties for each hard drive's Recycle Bin independently or apply the settings to all drives. On the Global tab, if you put a check mark next to Do Not Move Files To The Recycle Bin, you can bypass the Recycle Bin entirely and free up even more drive space. Caution: This method does not allow you to recover accidentally deleted files.

To banish the warning message about deleting the contents of your Recycle Bin, remove the check mark from Display Delete Confirmation Dialog Box. To manually delete the contents of the Recycle Bin, double-click the Bin to open it, then select Empty Recycle Bin from the File menu.

My Briefcase

WinNT and Win 2000. The Briefcase (known as My Briefcase in WinNT) is a feature that helps you keep files in sync between your desktop and notebook computers in WinNT. To use it, drag your files to the Briefcase icon before releasing the mouse. You can then drag the Briefcase to a diskette or transfer it to your notebook. You can make changes to the original files or to those in the Briefcase. To make sure your files match and you have the most current version in all locations, open the Briefcase window. Choose the Briefcase menu and then select the Update All command. You also can update one file at a time if you don't want to update all of them.

Win9x. If you travel with a computer, you have probably faced the problem of keeping files in sync. Perhaps you have an address book or sales database you take with you, adding new contacts along the way. When you get back to the office, you need to ensure the files on your office computer match the files on your notebook. To help with this sometimes-confusing process, Microsoft has provided the My Briefcase utility.

Before you hit the road, copy the files you will need to My Briefcase. While you are traveling, open My Briefcase and use and update the stored copies of the files. When you return to the office, use My Briefcase to update your office computer.

My Briefcase relies on your computer's internal calendar and clock to determine which files are the newest versions so make sure your desktop computer and notebook have the same date and time. Once they're in sync, you can load My Briefcase.

To begin, locate the documents you want to use on the road and drag them to the My Briefcase icon. You also can right-click a document and select Send To and then My Briefcase to copy the files. Once all the necessary documents are in My Briefcase, move My Briefcase to your notebook. You can use the office network or a diskette to move My Briefcase, but be aware that if you use a diskette, file sizes are limited.

When you're on the road, keep the files stored inside My Briefcase while you work on them. Double-click My Briefcase and then double-click the document of your choice, or use the Open command in the program that created the document, and then choose My Briefcase from the Look-In drop-down menu. Select the file and click Open.

When you get back to the office, move My Briefcase back to your desktop computer, then open My Briefcase and select the Briefcase menu and then Update All. If you only want to update certain documents, highlight the documents and choose Update Selection from the Briefcase menu. The Update My Briefcase dialog box will open, listing the files which it will update and where the update will come from. Click Update to complete the process.

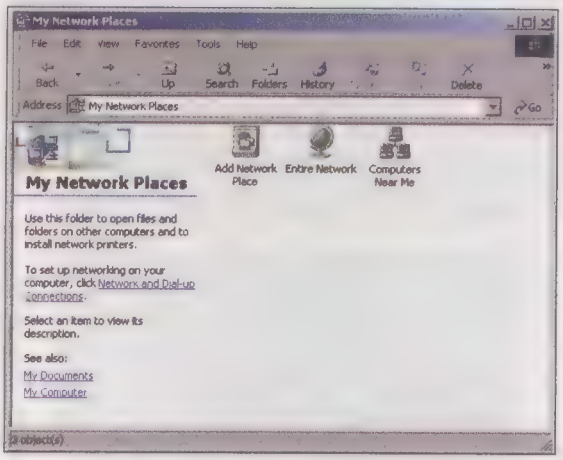
Network Neighborhood

WinNT and Win2000. You can find out helpful information in the Network Neighborhood window (My Network Places in Win2000) about the other computers connected to yours in WinNT and Win2000. For example, you can select a computer to see what shared resources, such as printers, it uses. To quickly scan a list of the available printers and folders, double-click Entire Neighborhood. You also can connect to another computer by double-clicking it.

If you're an administrator, you'll also appreciate the tools you can use in the Network Neighborhood window to manage the system. For example, you can map network drives by right-clicking in the Network Neighborhood window and then choosing Map Network Drive.

Finally, in Win2000, if you want to find out how you're logged in on a computer, right-click the Network Neighborhood icon and then choose Who Am I.

Win9x. Network Neighborhood displays the computers presently connected to the same workgroup. Assuming the computers have their file and resource sharing features active, and you have the necessary access privileges, you can access files and resources on any of the available computers.


My Network Places
File Edit View Favorites Tools Help
Back Up Search Folders History Delete
Address My Network Places
Go
Add Network Place
Entire Network
Computers Near Me
My Network Places
Use this folder to open files and folders on other computers and to install network printers.
To set up networking on your computer, click Network and Dial-up Connections.
Select an item to view its description.
See also:
My Documents
My Computer

In Win2000, Network Neighborhood has been renamed to My Network Places, and it offers you a few more features.

You also can use Network Neighborhood to quickly access the Network control panel and make changes to your network configuration. Right-click Network Neighborhood and select Properties from the pop-up menu. Select the Identification tab to change your computer's name in Network Neighborhood or change your workgroup. Windows peer-to-peer networking allows only computers with the same workgroup name to be available in Network Neighborhood. If you don't see any computers listed, check to be sure you have entered the correct workgroup name. Click OK to save any changes and to dismiss the Network control panel.

If you are having problems accessing other computers on your network, and you run Win98, try using the Windows Network Troubleshooter. Select the Start button and then click Help. Select the Contents tab, Troubleshooting, Windows 98 Troubleshooters, and then Networking. Step through the questions to help get your network online. Win95 users, select the Start button, Help, the Contents tab, Troubleshooting, and then If You Have Trouble Using The Network.

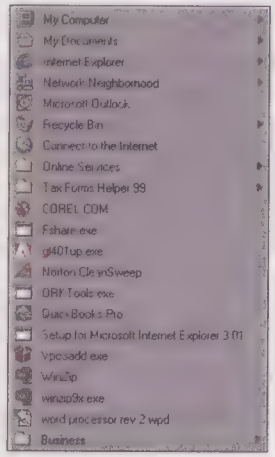
If you routinely access the same network computer, you can make the task a bit easier by mapping that computer's drive to your computer. Mapping allows the drive to show up in My Computer as just another local hard drive. To map a network computer's drive to your machine, double-click the Network Neighborhood icon on your Desktop. Select and open the computer you want to access, then right-click the icon for the resource you want to map. This is usually a hard drive, but it also can be a folder. Select Map Network Drive from the pop-up menu and then pick an available drive letter from the drop-down list. If you want this resource to always be available, place a check mark next to Reconnect At Logon. If the shared resource requires an access password, Windows will prompt you to enter one. If you want to automate the connection without supplying a password each time, place a check mark next to Save This Password In Your Password List after you log in. Click OK to save your selections and dismiss the dialog box.

Internet Explorer

WinNT and Win2000. IE5, the browser software that helps you cruise around the Internet, comes bundled with Win2000. It appears on your Desktop as an icon, as well as an icon for the IE on the Quick Launch toolbar on the Win2000 Taskbar. (*NOTE: WinNT users can download 5.0 from the Microsoft Web site at http://www.microsoft.com.*)

Additionally, IE helps you jump onto the Web from almost anywhere on your computer, giving you a level of integration with the Web that most users could only dream about a few years ago.

To initially set up your connection to the Internet, you can use the Internet Connection Wizard. Double-click the Connect To The Web icon, and then work through the pages of the wizard. (The Internet Connection Wizard



IE5 adds optional pop-up toolbar menus to the Taskbar in Win9x, reducing overcrowding and providing fast access to programs and resources.

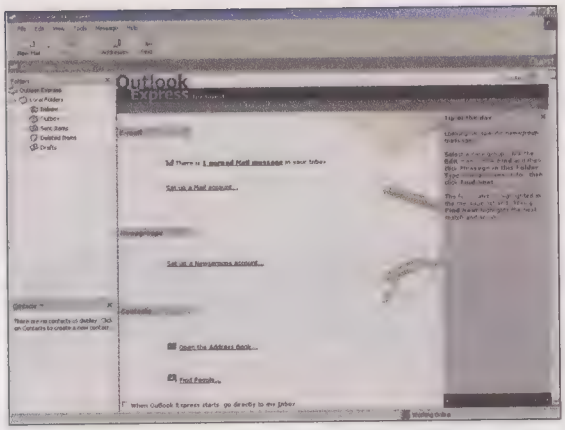
also launches the first time you start IE or Outlook Express.)

After you set up your account, you're free to cruise around the Web. You also can access the buttons on the IE Standard toolbar by choosing the View menu, Toolbars, and then Standard Buttons. To display a Web page, just type the Web address (that's the http://www. thing) in the address bar area of the IE window and press ENTER. If you don't know the address for a Web site, you can use a tried-and-true Search Engine such as Yahoo! (http://www.yahoo.com) or Google (http://www.google.com). Alternately, use the Search field displayed on the MSN page that automatically displays. Enter the topic you want to find, such as vacations or cars, in the provided filed on the search engine's home page and then press ENTER to see a listing of Web pages related to the topic. Click a link to display the associated page.

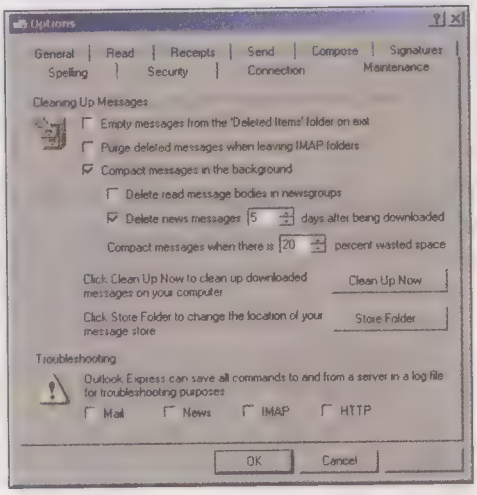
After you locate an interesting Web page, you can add it to your FAVORITES folder so you can find it again (not always an easy task otherwise given the millions of Web sites in cyberspace). With the page displayed, open the Favorites menu and choose Add To Favorites. Click OK. The next time you want to see the page, open the Favorites menu, and then click the item you want.

Another way you can hunt up those elusive (but recently-used) Web addresses is to IE's History feature. Just click the History button on the Standard Buttons toolbar to display a listing of sites you visited, organized by when you viewed them. Click a date to see the sites viewed on that day. When you find the site you want, click it to display the associated page.

To make your time on the Web productive, IE includes other features to help you operate as efficiently as possible. For example, if you type in one of those long Web addresses you've previously used, the Explorer's AutoComplete feature will automatically fill in the remainder of the entry, saving you the trouble of typing in those picky, must-be-letter-perfect addresses. If the AutoCorrect feature isn't on, you can turn it on by right-clicking the Internet Explorer icon and then choosing Properties from the pop-up menu. Next, click the Content tab and choose AutoComplete. In the AutoComplete Settings dialog box, check the box for Web Addresses before closing all dialog boxes.



Use Outlook Express 5 to manage your e-mail in Win2000.



Use the Options dialog box to control how Outlook Express operates in Win2000.

You also can jump to the Web from almost anywhere on your system. For example, you can click a Web address in a program such as Word or Excel 2000 to quickly open IE and connect to the Web.

Finally, you can ensure a higher level of security by using the Content Advisor. Right-click the Internet Explorer icon and choose Properties. Then click the Content tab. Click the Enable tab to display the Content Advisor dialog box. On the Ratings page, choose the type of sites you allow users to view. You can further specify which sites to allow on the Approved Sites page. When you finish, close all the dialog boxes.

Win9x. Win98 Second Edition includes IE5. (Win95 users can upgrade to IE5 at http://www.microsoft.com/windows.ie.) IE 5 adds new features to both the browser and the Win9x Desktop, including optional pop-up menus in the Taskbar. Instead of a crowded Taskbar, you can now shrink each Taskbar's toolbar to its smallest size, and then access toolbar items from a pop-up menu.

IE5 also has improved search tools, allowing you to specify which search engines to use and in what order to use them. From the View menu, select Explorer Bar, Search, and then click the Customize button. Locate the Find A Web Page section, which lists nine search engines. Place a check mark next to the search engines you want to use, in the order you want to search them. The first search engine you select will be the first one on the list, the second search engine you select will be the second one searched, etc. To change the order, deselect the search engines, and then reselect them in the preferred order. You can apply the same technique to the other search functions.

IE5 also has upgraded multimedia capabilities, including Windows Media Player and a Radio toolbar for accessing Internet radio broadcasts. To access the Radio toolbar, select the View menu, Toolbars, and then Radio. Once the toolbar displays, you can access stations by clicking the Radio Stations button.

Microsoft Outlook Express

WinNT and Win2000. Microsoft Outlook Express is the personal information management software that comes as part of Win2000. Outlook Express includes several handy features you can use to organize your life, including a simple e-mail program and a way to access newsgroups. Additionally, you can keep the electronic version of a Rolodex: a contacts folder with information about clients, friends, and co-workers. (*NOTE: WinNT users can download Outlook Express with IE5 from the Microsoft Web site.*)

To open Outlook Express, choose it from the Quick Launch toolbar. You'll see Outlook's three-pane view for managing your e-mail, newsgroups, and contacts. Some of the new features associated with Outlook Express 5.0 include the ability to request a receipt so you know a recipient has opened a message. Additionally, you can use electronic stationary to jazz up your messages. You also can create multiple identities on a single machine, which is handy if you have more than one e-mail address or need to set up multiple users on a single machine. Finally,

the newest version of Outlook Express includes support for Hotmail accounts.

To create a new, blank mail message, click the New Mail button on Express' toolbar. If you prefer to use electronic stationary, click the New Mail button's down arrow, then choose a stationary type from the drop-down menu. For even more choices, you can choose Select Stationary from the drop-down list and then preview and select a stationary type in the Select Stationary dialog box.

It's also easy to add contacts to your address book. Right-click the name in a mail message or the Inbox and then choose Add Sender To Address Book. After the person's name appears on the Contact list, you can double-click it to quickly create a new message for them.

To create multiple identities on a machine (each with its own mail, newsgroups, and contacts), click Outlook Express on the folders list. Click the Identities link in the upper-right part of the window and then choose Add New Identity. Enter the name (and optionally the password) for the new identity. After you create an identity, you can quickly switch between them by opening the Identities menu, clicking Switch Identities, and then choosing a name on the list.

Keep in mind you also can change almost any setting related to running Outlook Express in the Options dialog box. For example, you can change how often you check for messages or whether you want messages sent immediately. You also can schedule maintenance tasks such as if you want to ditch deleted messages when you exit Outlook Express. To view the Options dialog box, choose Options from the Tools menu.

To find out the latest and greatest information on Outlook Express, go to Microsoft's Outlook Express Web page at http://www.microsoft.com/windows/oe.

Win9x. Win98 Second Edition includes Outlook Express 5 as the default e-mail client. (Win95 users can upgrade to Outlook Express 5 as part of the IE5 update at the Microsoft Web site at http://www.microsoft.com/windows.ie.) When you launch Outlook Express, it defaults to a general page that provides access to your e-mail, newsgroups, and address book. As handy as this page is, most of the time, you probably will use only the e-mail part of the program. You can instruct Outlook Express to start at your e-mail inbox by placing a check mark next to When Outlook Express Starts, Go Directly To My Inbox at the bottom of the page.

You also can choose the elements included in Outlook's windows and possibly reduce a bit of clutter. From the View menu, select Layout, and then place a check mark next to the elements you want to have available. If you're not sure what an element is, move the dialog box off to one side of your screen. Place or remove a check mark, then click the Apply button to view the results of your selection. When you finish making your selections, click OK to dismiss the dialog box.

Outlook Express supports multiple e-mail accounts. When you start up Outlook Express for the first time, it will guide you through setting up the primary account. To set up additional accounts, select the File menu, Identities, Add New Identity. Enter the name for the new account and then click the OK button. A dialog box will ask if you want to switch to the new identity; choose Yes. Outlook Express will then ask if you want to keep the present connection to the Internet; choose Yes. Outlook Express will reopen with the new account name and start the guide for adding an account. Follow the on-screen instructions to complete the setup process.

NetMeeting

Win2000 and WinNT. You can use Win2000's NetMeeting feature (and WinNT if you have the right version of IE) to set up an online meeting and share information with others in real-time over the Internet or your company's intranet. NetMeeting allows for active, electronic participation by everyone in the meeting via the whiteboard and chat windows. Because of this, it's especially handy for groups working together on a project. (*NOTE: NetMeeting does not come installed with the original versions of WinNT.*)

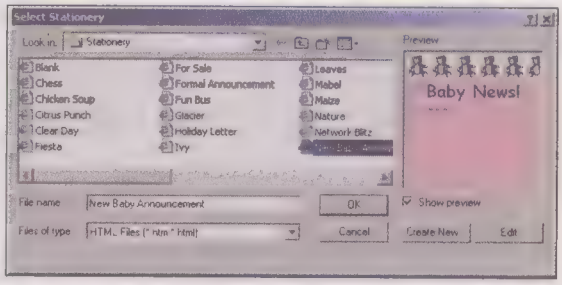
To set up the meeting, choose the Start button, Programs, Accessories, Communications, and then NetMeeting. (It also might be under Programs, Internet Explorer, NetMeeting.) Work through the pages in the NetMeeting dialog box to initially set up the information for your computer. After NetMeeting is set up on your system, you can start the meeting by displaying the NetMeeting dialog box (click the Start button, Programs, Accessories, Communications, and then NetMeeting) and then clicking the Place A Call button. Enter the e-mail address or phone number in the Place A Call Dialog box.

While the meeting is going on, use buttons on the Online Meeting toolbar to display or hide the whiteboard or chat windows so you can electronically incorporate meeting feedback. (If you want to find out more about using NetMeeting, open the NetMeeting dialog box and choose Help Topics from the Help menu.)

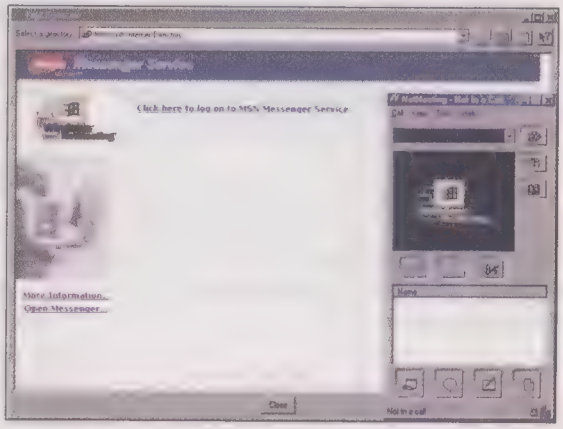
Win9x. NetMeeting is a real-time telephone and application-sharing program that can run over the Internet. You can use NetMeeting to

- talk to others using speakers and a microphone or a headset
- videoconference if both users have video cameras that support video for Windows
- collaborate on documents with others
- transfer files
- use a whiteboard
- chat using a text-based chat utility

NetMeeting 3.0, included with Win98 Second Edition and available as a download for Win95



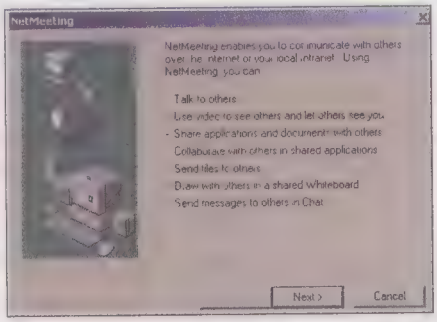
You can choose from several electronic stationary types to use in your e-mail in Outlook Express 5.01.



Win9x's NetMeeting is a real-time telephone and application-sharing program that lets users communicate and collaborate over the Internet.

users, may not have been installed by default on your computer. If you are using an older version of NetMeeting, you can upgrade to the latest version at the Windows NetMeeting section of the Microsoft Web site at http://www.microsoft.com/windows/netmeeting.

To install NetMeeting from the Windows CD-ROM, select the Start button, Settings, and then Control Panel. Open the Add/Remove Program control panel and select the Windows Setup tab. Choose Communications from the Component list, then click the Details button. Place a check mark next to Microsoft NetMeeting and click OK. Have your Windows installation CD-ROM ready and follow the on-screen instructions.


NetMeeting
NetMeeting enables you to communicate with others over the Internet or your local intranet. Using NetMeeting, you can:
Talk to others
Use video to see others and let others see you
Share applications and documents with others
Collaborate with others in shared applications
Send files to others
Draw with others in a shared Whiteboard
Send messages to others in Chat
Next >
Cancel

Use NetMeeting in Win2000 to electronically collaborate with others.

To run NetMeeting, select the Start button, Programs, Accessories, Communications, and then NetMeeting. (To open earlier versions of NetMeeting, try opening the Start menu, Programs, Accessories, Internet Tools, NetMeeting or the Start menu, Programs, Internet Explorer, and then NetMeeting or Microsoft NetMeeting.) If you are running NetMeeting for the first time, the NetMeeting Wizard will step you through the setup process.

NetMeeting makes use of directory services to locate other NetMeeting users. The default service is the Microsoft Internet Directory. To change the default service, select the Tools menu, Options, then select the General tab. Under Directory Settings, select a directory from the drop-down list. You can choose not to be listed in the directory by placing a check mark next to Do Not List My Name In The Directory. Although this option provides you with privacy, it also prevents others from easily finding you.

To have NetMeeting automatically log on to the directory server, place a check mark next to Log On To Directory Server When NetMeeting Starts. Click OK to save your changes and dismiss the dialog box.

Dial-Up Networking

WinNT and Win2000. Windows' network and dial-up connection features provide a way for your computer to connect to the Internet, a network, or another computer. To connect to a remote computer or network, display the Control Panel window by clicking the Start button, Settings, and then Control Panel. Then double-click the Network And Dial-Up Connections icon (called Network in WinNT). Choose a connection by double-clicking it.

Even if your computer isn't connected to a network, you can use the Network And Dial-Up Connections or Network to locate information on a remote computer. Just double-click the icon to see properties associated with the computer.

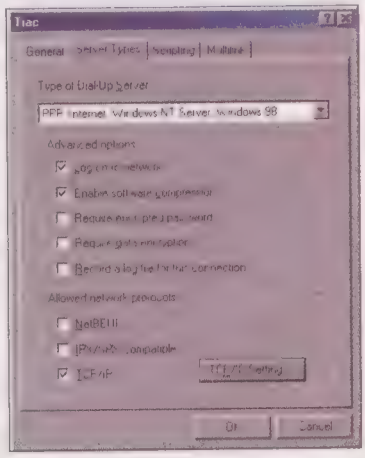
Finally, if you're interested in finding out more about using Win2000's dial-up networking features, choose Help in the Network and Dial-Up Connections window.

Win9x. DUN (Dial-Up Networking) is usually included with the default Win98 installation, although earlier versions of Win95 may not install it by default. If it isn't loaded, you can add it by selecting the Start button, Settings, and then Control Panel. Open the Add/Remove Program control panel, and then select the Windows Setup tab. Choose Communications from the Component list and then click the Details button. Place a check mark next to Dial-Up Networking and then click the OK button. Have your Win9x installation CD-ROM ready and follow the on-screen instructions. Once you have installed the software and your computer reboots, you should have all the components required to dial up your ISP (Internet service provider).

To verify that all items are in place, go to the Start menu and click Settings and then Control Panel. Double-click the Network control panel. In the Network dialog box, select the Configuration tab. You should see an entry labeled TCP/IP -> Dial-Up Adapter. If not, add it by clicking the Add button. In the Network Component type list, choose Protocol and then click the Add button. Select Microsoft from the Manufacturers list then select TCP/IP from the Network Protocols list. Click OK to install the new protocol. (You may need your Win9x CD-ROM.) Follow the on-screen instructions to complete the installation.

Once you install Dial-up Networking, you can create one or more connection profiles. A profile is a set of commands your computer uses to connect to a specific ISP or other remote computer system. To create a new profile, open My Computer and then Dial-Up Networking or select the Start button, Programs, Accessories, Communications, and then Dial-Up Networking. Win95 users, select the Start button, Programs, Accessories, and Dial-Up Networking. Once Dial-Up Networking is open, double-click Make New Connection. This will start the Connection Wizard and walk you through creating a profile.

Once the process is complete, Windows will place a new dial-up connection in the DIAL-UP NETWORKING folder. You will still need to configure the connection parameters; your ISP usually provides this information. Right-click your new dial-up connection icon and select Properties from the pop-up menu. Select the Server Types tab and then choose the type of server you are connecting to; the most common is PPP: Internet, Windows NT Server, Windows 98. Win95 users will see PPP: Windows 95, Windows NT 3.5, Internet. Under Advanced options, make sure the following are checked: Log On To Network and Enable Software Compression. Under Allowed Network Protocols, make sure only TCP/IP is selected if you only use this connection to access an ISP; otherwise, check with the service you'll

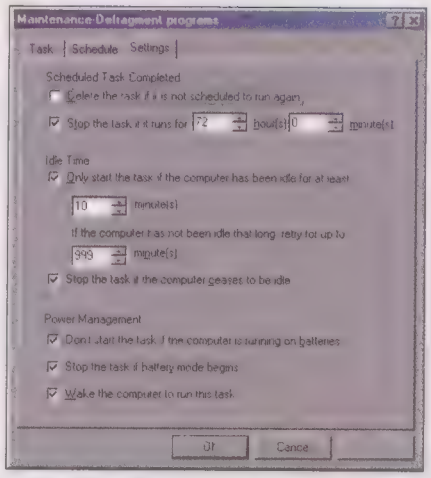


Use Dial-Up Networking in Win9x to configure or automate connections to your Internet service provider or other remote computer system.

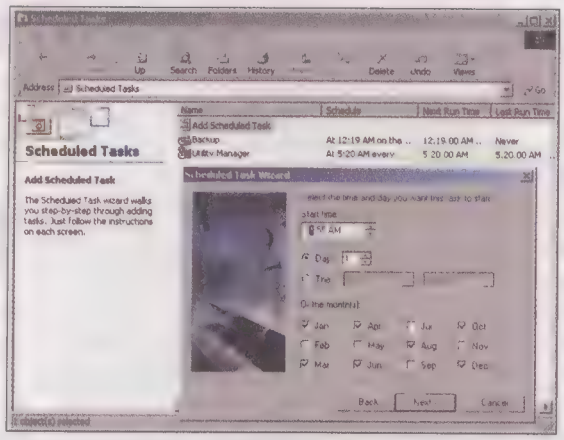
be calling for the correct settings. Click the TCP/IP Settings button and enter any required information provided by your service provider. Most services use the default settings; although, some may provide specific name server addresses. Click OK after making any changes, then click OK again to dismiss the dialog box.

You should now be ready to make the connection. Double-click your new Dial-Up Networking icon to start the connection process and enter your user name and password. To have your password remembered and automatically entered on subsequent connections, place a check mark next to Save Password.

If you have more than one dial-up networking connection, you can set one to be the default. Select the Start button, Settings, Control Panel. Open the Internet Options control panel and select the Connections tab. Win95 users, click the Settings button. From the list of Dial-up Networking connections, select one. Click OK and then Click OK a second time to dismiss the dialog box. Win98 users, from the list of Dial-Up Settings, select one to be the default and then click the Set Default button. Click the OK button to apply your changes and dismiss the dialog box.

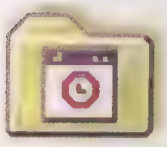

Maintenance Defragment programs
Task
Schedule
Settings
Scheduled Task Completed
Delete the task if it is not scheduled to run again
Stop the task if it runs for
hour(s)
minute(s)
Idle Time
Only start the task if the computer has been idle for at least
minute(s)
If the computer has not been idle that long retry for up to
minute(s)
Stop the task if the computer ceases to be idle
Power Management
Don't start the task if the computer is running on batteries
Stop the task if battery mode begins
Wake the computer to run this task
OK
Cancel

The Task Scheduler feature in Win98 lets you automate routine computer-maintenance tasks that everyone hates (or forgets) to do.



You can easily edit a scheduled task in Win2000 by right-clicking it and then selecting Properties.

Scheduled Tasks/ Maintenance Wizard



Win2000. If you tend to push important maintenance tasks, such as scanning for viruses or defragmenting your hard drive, to the back burner, don't worry. You can rely on Win2000's Maintenance Wizard to automatically and regularly schedule and run these housekeeping tasks. First, open the Start button, Setting, and Control Panel. Then double-click the Scheduled Tasks icon. Double-click the Add Scheduled Task icon to launch the Scheduled Task Wizard. Click Next to advance past the opening screen and display a page of programs on your system. Choose the program you want to automatically run at a particular interval, such as daily, weekly, or monthly, and click Next. On the next page, specify how often you want the program to run before clicking Next. Indicate the start time and date and then advance to the next screen. Finish working through the remaining pages of the Wizard, and your task is set to run. (*NOTE: This feature isn't available in WinNT.*)

Win9x. The Task Scheduler in Win98 allows you to run a program at predetermined times. This is useful for automating routine computer-maintenance tasks, such as defragmenting your hard drive, running Scan Disk, or any other programs or scripts you may have.

If you have Win95 and the Plus! Pack installed, you have a similar utility called System Agents. System Agents are very similar to the Task Scheduler and many of the items mentioned here apply to both. If you upgrade to Win98, any system agents you created will be converted for use with the Task Scheduler.

To open the Task Scheduler, select the Start menu, Programs, Accessories, System Tools, and then Scheduled Tasks (or Task Scheduler). You also can double-click the Task Scheduler icon in your system tray. To add a task, double-click the Add Scheduled Task icon. The Scheduled Task Wizard will display a list of programs you can schedule to automatically run; use the Browse button to locate additional programs or scripts. Select a program and then click the Next button. Choose a frequency for the task and click Next. Depending on your previous choice, you will either be asked to select a specific time to run the program or told You Have Successfully Scheduled The Following Task. Click Finish to complete the process.

To edit a scheduled task, right-click the task's name and choose Properties from the pop-up menu. You can adjust the scheduled time, as well as set the conditions required for the program to run and what to do if the program fails to complete. To adjust the schedule, click the Schedule tab. The Advanced button lets you create schedules that run from specific start dates to specific end dates. It also lets you set multiple times to run the program, such as 10 minutes. Under the Settings tab, you can choose to stop the task if it runs longer than a defined time period, as well as modify the start time depending on whether the computer is idle. You can also specify if the task should run if you are using power-management features, such as a notebook running on batteries, or if the computer is in Sleep mode.

The Maintenance Wizard is a quick way to add Scan Disk, Disk Defragmenter, or Disk Cleanup to your scheduled tasks. To run the Maintenance Wizard, select the Start button, Programs, Accessories, System Tools, and then Maintenance Wizard. Once you finish running the Maintenance Wizard, your Task Scheduler will be updated. You can modify these items in your Task Scheduler just like any other scheduled task.

So, tap into some of Windows' fun stuff and get ready to electronically zoom around the block and across the country. LS

by Linda Bird, Tom Nelson, and Mary O'Connor

Glossary

ActiveX—A program introduced by Microsoft that is used to instruct certain technologies how to involve COM (component object model) and OLE (object linking and embedding) functions. ActiveX can be incorporated within most programming languages. It lets Web site creators make interactive, multimedia Web pages and links to Microsoft Desktop products to the Web. For instance, through ActiveX controls, users could view Microsoft Word or Microsoft Excel documents through Microsoft Internet Explorer. Although the results of ActiveX controls may be similar to those of Java applets, Java is a programming language, while ActiveX is a set of controls written with Microsoft's Visual Basic.

Advanced Technology Attachment Packet Interface (ATAPI)—An extension to the EIDE (Enhanced IDE) interface that supports CD-ROM and tape drives, which were left out of the original EIDE and IDE standards.

channels—The path through which information flows from one device to another. This link can be either internal or external to the computer. Internally, a channel is more commonly called a bus. It is the physical link that facilitates the electronic transfer of digital information. A channel transfers information, for example, from the CPU to the keyboard. Externally, and typically in communications, it is a line or circuit that carries either analog or digital information, depending on the type of channel. Channel also can refer to an individual chat group using the Internet Relay Chat system.

dial-up networking (DUN)—A built-in feature of Windows 95 that lets a computer connect to a network via a modem. It usually uses either the PPP (Point-to-Point Protocol) or SLP (Serial Line Internet protocol) to control the traffic between the computer and remote network. Windows 3.1 did not offer built-in DUN support. Instead, users had to obtain dial-up software such as Trumpet Winsock. Dial-up networking is almost exclusively used for connecting PCs to the Internet.

dynamic data exchange (DDE)—A two-way connection between multiple programs that lets the programs actively exchange data while both programs are running. This exchange of data without user intervention is known as a conversation. Available with Windows and OS/2, this feature lets users use one program to manipulate data in another program. For example, if you use a communications program and a modem to connect to an information bulletin board, you can use a DDE to connect the incoming information to a word processing template for viewing. The incoming information may change, but the template will remain the same.

Enhanced Integrated Drive Electronics (EIDE)—Also known as Fast ATA (Fast AT Attachment), this is an updated version of the IDE (Integrated Drive Electronics) storage interface that works with hard drives and CD-ROM drives. It can shuttle data to and from the drive three to four times faster than the IDE standard (transferring data between 11MB and 16.6MB per second) and can support data storage devices that store up to 8GB more than IDE drives.

hashed password—A password encrypted with a very simple cipher that is easily broken if the password is picked up in transmission.

network—A set of conjoined computers that can share storage devices, peripherals, and applications. Networks may be connected directly by cable connection or indirectly by telephone lines or satellites and can be part of a small-office system or a global web of numerous other networks.

patch—A piece of code inserted into software to temporarily fix a defect. While most users do not consider a patch as a shortcut or a shabby way to fix a problem, adding too many can make a program difficult to maintain. Programmers often create patches to fix problems and add features to a program during the timeframe when users are awaiting the release of a new version of the program that already includes the "patched" corrections and new features.

private key—The secret half of a two-part public key encryption system. The private key is kept secret and never transmitted over an open network. The private key is used to decode data that has been encrypted with a user's public key, which is available to everyone over a network. In this way, a person can send information encrypted with Bob's public key, safe in the knowledge that only the holder of Bob's private key will be able to read it.

Public Key—The public part of a two-part encryption system. Users can encrypt information using someone's public key with the knowledge that only the owner of the corresponding private key will be able to open it. Conversely, users can encrypt information with their private keys so that the only way to read it is to decode it with the commonly available public key. This way, other users know for sure who sent data because only the correct public key will decode the information.

resolution—The amount of definition and clarity in an image on a monitor or from a printer. In monitors, resolution is measured by the number of pixels the device can display. In printers, resolution is measured in dots per inch (dpi) that can be printed on paper. Generally a user can dictate the number of pixels on a monitor, up to its capacity, by changing the display standards. In Windows, this capability is found in the Control Panel.

root directory—The mother of all directories. The root directory is the one from which all the other directories branch out; it has no parent directory. The root directory of a drive is the letter name of that drive followed by a backslash; for example, the root directory of the C: drive is the C:\ DIRECTORY.

Small Computer System Interface (SCSI)—(Pronounced scuz-zee.) A standard for parallel interfaces that transfers information at a rate of up to 80MBps (megabytes per second). Up to seven peripheral devices, such as a hard drive and CD-ROM drive, can attach to a single SCSI port on the system's bus. SCSI ports were designed for Apple Macintosh and Unix computers, but also can be used with properly equipped PCs.

update—To replace older versions of software or files with a newer version. Also refers to when a company releases a new version of software that's already on the market. This is usually indicated by a change in the version number, such as changing from 6.2 to 6.21. These software updates usually fix minor problems, or bugs, the older version contained.

Article titles are in bold type.

#

"Windows 98 Annoyances", Karp, 93
128-bit Dial-Up Networking Upgrade, 96
16-bit, 43, 66
32-bit, 43, 66
50 Ways To Speed Your Windows: Boost Performance & Minimize Work With These Tips, 42-45

A

A Win2000 Walk-Through: Explore New, Industrial-Strength Features In This Windows Powerhouse, 70-73
Accelerated Graphics Port (AGP), 66
Accessibility options, 129
ACP. *See Application Compatibility Program.*
ACPI. *See Advanced Configuration and Power Interface.*
Active Desktop, 70, 132-133
ActiveX, 121
Add/Remove Programs, 123
Advanced Configuration and Power Interface (ACPI), 9
Advanced Technology Attachment (ATA/66), 42
Advanced Technology Attachment Packet Interface (ATAPI), 119
AEDebug key, 120
AGP. *See Accelerated Graphics Port.*
Appearance, Win98, 82
Application Compatibility Program (ACP), 67
Archiving files, 57
ATA/66. *See Advanced Technology Attachment.*
ATAPI. See Advanced Technology Attachment Packet Interface.
Autoexec.bat, 60
AxMan, 58

B

Back To Business: What Windows 2000 Means For You, 65-67
Backing up the Registry, 47
Backup; Win2000, 76
Backwards-compatibility, 60
Binary values, 47

C

Calculator, 49-50
Cassiopeia E-100, Casio, 33
Cat 5. *See Category 5.*
Category 5 (Cat 5), 20
CD player, 50
Change date & time, 122
Change The Win98 Registry: Understanding & Using The Power Behind Its Structure, 85-86
Change The WinNT Registry: Getting To The Heart Of The OS, 110-111
Changing icons, WinNT, 105
Channels, 132-133
Character Map, 50-51
Check Disk options, 76
Classic Desktop, 70
Classic Style, 79
Client/server network, 21
Clock, 108
Command.com, 61
Common Win98 Error Messages: Tips To Solve Your Windows Woes, 87-89
Common WinNT Error Messages: Understanding The Problem, 112-114
Compatibility problems, Win98, 93, 94
Compatibility, 38
Compression, 58
Config.sys, 61
Control Panel, Win2000, 73
Copying files, 57
Cross-linked files, 39
Customize Start menu, 12
Customize Win98: Putting The Pieces Into Place & Making Yourself At Home, 82-84
Customize WinNT, Don't Let Your Systems Administrator Have All The Fun, 107-109
Customizing the Taskbar, Win98, 92

D

DAT. *See digital audio tape.*
DataFactory key, 120
DDos. *See distributed denial of service.*
Defragmentation, 76
Delete TEMP files, 130
Desktop icons, 13, 79, 107
Desktop settings, 124
Desktop shortcuts, WinNT, 108
Desktop, Win95, 99; Win98, 83; WinNT, 104
Device drivers, 25
DHCP. See Dynamic Host Configuration Protocol.
Dial-Up Network, 13, 140
Digital audio tape (DAT), 116
Digital Subscriber Line (DSL), 66
DirectX 6.1, 78
DirectX 7.0, 101
Disk Cleanup, 44
Disk Defragmenter, 37, 39
Distributed denial of service (DDoS), 26
Document icons, 80
Drive problems, Win2000, 75
DSL. *See Digital Subscriber Line.*
Dual boot, 2
DWORD, 47
Dynamic Host Configuration Protocol (DHCP), 78

E

Effects tab, 125
EFS. *See Encrypted File System.*
EFS. See Encrypted File System.
EIDE. See Enhanced Integrated Drive Electronics.
Emergency Repair Disk (ERD), 47, 76, 113
Emergency Startup Disk, 90
EMF. *See enhanced metafile.*
EMM386.exe, 61
Encrypted File System (EFS), 28, 32
End Task, 14
Enhanced Integrated Drive Electronics (EIDE), 119
Enhanced metafile (EMF), 43
ERD. *See Emergency Repair Disk.*
Error messages, 113, 114; Win98, 87-89

F

FAT16, 43, 62-64, 73, 118
FAT32, 43, 62-64, 73, 118
File allocation table (FAT), 43, 73
File Splitter Deluxe, 58
Files You Need To Know: The Essentials For Running Legacy Programs, 60-61
Files, 11
Folder icons, 79
Folders, 11
Font Smoothing, 106
Fonts, 109
Full Window Drag, 106

G

Games, 51-52
Grafitti, Palm, 33
Graphical user interface (GUI), 13
GUI. *See Graphical user interface.*

H

Hardware errors, WinNT, 114
Hibernate feature, 8
High Performance File System (HPFS), 103
High-density diskettes, 97
Hot docking, 33
Hot swap, 12
HPFS. *See High Performance File System.*
HyperTerminal, 52

I-J-K-L

I/O address. *See input/output address.*
Icons, 122
ICS. *See Internet Connection Sharing.*
IE 5.5. *See Internet Explorer 5.5.*
IEEE 1394, 66
Image Source Redirect Vulnerability, 96
Imaging, 52-53
Industry Standard Architecture (ISA), 17-19, 42
Input/Output address (I/O), 16
Installing hardware upgrade, 17
Installing Windows 2000: What The Newest Microsoft System Needs, 68-69
Internal modem, 18
Internet Connection Sharing (ICS), 81
Internet Explorer 5.01, Win95, 101
Internet Explorer 5.5, 10, 137
Internet Explorer Schannel.dll Update, 96
Internet Functionality; Windows 98 SE, 78
Interrupt request line (IRQ), 16, 18, 35
IRQ. *See Interrupt request line.*
ISA. *See Industry Standard Architecture.*
ISS Security Host Manager, 110
Kerberos, 28
Kernal, 118
Keyboard, Win95 shortcuts, 100; Win98 shortcuts, 83; customize, 127
Keys, 47, 85
Last Known Good Configuration, 117

M

Maintenance Wizard, 141
Make PCs Connect: Tips To Set Up & Troubleshoot Windows Networks, 20-25
Media Player, 53
Medium, 57
Microsoft Outlook Express, 138
Microsoft Plus!, 106
Microsoft Web Resources, 94
Microsoft Windows NT Resource Kit, 106
Modems, 17, 19
Module, 118
Monitor tab, 125
Mouse, 108; customize, 128; Win98, 83:
Moving files, 57
My Briefcase, 136
My Computer, 134
My Documents, 135

N

National Computer Security Center (NCSC), 29
NCSC. *See National Computer Security Center.*
NetBEUI. *See Net BIOS extended user interface.*
NetBIOS extended user interface (NetBEUI), 21
NetMeeting 3.0, 78, 139
Network hub, 20
Network interface card (NIC), 20
Network Neighborhood, 137
Networking cable, 20
NIC. *See network interface card.*
Notepad, 53
NT file system (NTFS), 28, 63, 73, 103
NTFS. *See NT file system.*

O-P-Q

Outlook Express, 78
Overclocking, 42
Paint, 53
Part It, 58
Partition Magic, PowerQuest, 118
Passwords, 26, 128
PCI. *See Peripheral Component Interconnect.*
Peer-to-peer network, 21
Performance, 125
Peripheral Component Interconnect (PCI), 17-19, 42
Phone Dialer, 54
Plug and Play, 12, 16
Power Toys, 106
Printing errors, WinNT, 112-113
Private keys, 29
Program errors, WinNT, 113
Program icons, 80
Public keys, 29
QIC-40, 116
QIC-80, 116
Quick Launch toolbar, 80

R

RAID. *See Redundant Array of Inexpensive Disks.*
RAM. *See random-access memory.*
Random-access memory (RAM), Win95, 98
RASes. See remote access services.
Ready, Set, Prepare: General Tips To Equip Your System For A Windows Installation, 38-40
Recovery Console, 77
Recycle Bin, 135
Redundant Array of Inexpensive Disks (RAID), 114
Registry Editor, 85
Registry scripts, 86
Registry, 123
Reinstallation Rundown: When & How To Reinstall Win95 & Win 98, 34-37
Remote access services (RASes), 32
Resume feature, 8

S

Safe Mode, 91, 92; Windows, 77
ScanDisk, 37, 44
Scheduled Tasks, 54, 141
SCM. *See Security Configuration Manager.*
Screen savers, 127; WinNT, 109
SCSI. *See Small Computer System Interface.*
SCU. *See System Configuration Utility.*
Searching for files, 58
Security Configuration Manager (SCM), 110
Server Gated Cryptography (SGC), 120
Set up a printer, 131
Settings tab, 125
SFC. *See System File Checker.*
SFT. *See system file protection.*
SGC. *See Server Gated Cryptography.*
Shortcut icons, 80
Shortcuts, 11
Small Computer System Interface (SCSI), 118
SoundBlaster, 119
SoundSentry, 108
Spooling, 43, 116
Standard applications, 49
Standard Applications: Tips For Using The Build-In Programs In Win95, Win98, WinNT & Win2000, 49-54
Star network topology, 20
Start Menu, Win2000, 71
StickyKeys, 108
String, 47
Super Video Graphics Array (SVGA), 117
SVGA. *See Super Video Graphics Array.*
Swap file, 117
System Administrator, 111
System Commander, 40
System Configuration Utility (SCU), Win 98, 91
System File Checker (SFC), 91
System file protection (SFT), 9
System Monitor, 44
System Tray, 11
System.ini, 60

T

Taskbar, 109; Win95, 98; Win98, 84; WinNT, 104; Win2000, 71
TCP/IP. *See Transmission Control Protocol /Internet Protocol.*
The Mobile Windows Picture: A Look At This Versatile System, 30-33
The Windows Registry: Making sense Of Its Keys & Values, Then Using Them To Benefit You, 46-48
Transmission Control Protocol/Internet Protocol, (TCP/IP), 21
Troubleshoot Win2000: Determine The Source Of Your Problem, 75-77
Troubleshoot Win98: Tips To Keep Your OS Running Smoothly, 90-92
Troubleshoot WinNT: Making Adjustments To Enhance Your Operating System's Performance, 115-117
Troubleshooters, Win2000, 75
Troubleshooting Wizards, Win98, 89
Tune-ups, Patches & Updates, Win98, 92
Tweak UI, 43, 106

U

UART. *See Universal asynchronous receiver-transmitter.*
Universal asynchronous receiver-transmitter (UART), 17
Universal Plug and Play (UPnP), 10
Universal Serial Bus (USB), 42, 66
Updates, Windows 95, 101, 102
Upgrade Fever: Tips To Perform & Troubleshoot Windows Hardware Installations, 16-19
Upgrading from Win9x, 95
UPnP. *See Universal Plug and Play.*
USB. *See Universal Serial Bus.*
User Shell Folders key, 120

V

Value, 47, 85
VGA. *See Video Graphics Array.*
Video adapters, 103
Video Graphics Array (VGA), 103, 118, 119

W-X-Y-Z

Wallpaper, 126
Web Style, 79
What To Expect From Windows Me: Microsoft's Next OS Has Plenty To Offer Home & Small-Business Users, 8-10
Whistler, 9
WIA. *See Windows Image Acquisition.*
Win.ini, 60
Win95 Secrets: Tips For The Desktop, Taskbar & More, 98-100
Win95 System Requirements: Watch The RAM & Disk Drive, 97
Win95 Updates & Patches: Where to Find Flaw-Fixers & Performance Enhancers, 101-102
Win98 Compatibility Problems: When Hardware & Software Won't Work With Windows, 93-94
Win98 Customer Service Pack, 96
Win98 SE Shutdown Supplement Patch, 96
Win98 SE USB Patch, 96
Win98 Secrets: Explore These Hidden Features & Tricks, 79-81
Win98 System Requirements: Don't Let The Minimum Fool You, 78
Win98 Updates & Patches: Downloads Help This OS Stay Up To Date, 95-96
Windows 2000 Professional, Microsoft, 31, 32
Windows 2000, 6-7
Windows 95, 5
Windows 98 Second Edition, 5-6
Windows 98 Year 2000 Upgrade and Update 2, 96
Windows 98, Microsoft, 30, 31
Windows CE, Microsoft, 32, 33
Windows Explorer, 56
Windows File Management: Organizing Your Files & Folders Into A Logical Sequence, 56-59
Windows File Protection, 75
Windows File Systems: What You Need To Know About Fat16, Fat32 & NTFS, 62-64
Windows How-Tos, 122-131
Windows Image Acquisition (WIA), 9
Windows NT 4.0, 6, 118, 119
Windows Security: Measures To Protect Your PC, 26-29
Windows Shopping: Find Out Which Microsoft OS Is Right For You, 5-7
Windows Wonders: Answers To Some Of The OS's Most Frequently Asked Questions, 11-14
Winfile.exe, 61
WinNT Compatibility Problems & Solutions, Resolve FAT & Device Driver Issues, 118-119
WinNT Secrets: Find Tips To Help You With Everyday Tasks, 104-106
WinNT System Requirements: Your Knowledge Is As Critical As System Elements, 103
WinNT Updates & Patches: Create A Safer, More Efficient Operating System, 120-121
WordPad, 54
Workgroup, 21
Working With Windows Components, 132-141
Year 2000 Update, Win95, 101
Zombies, 29

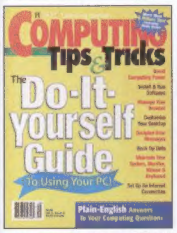
More Than 10 Million Sold!

Guide & Learning Series by Smart Computing IN PLAIN ENGLISH

In-depth tutorials in PLAIN ENGLISH!

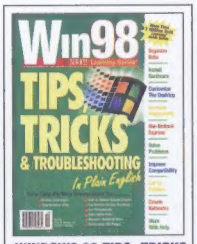
$7.95 each or $3.95 each to *Smart Computing* Subscribers

Satisfaction Guaranteed



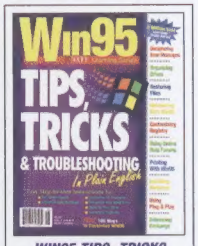
COMPUTING TIPS & TRICKS
This do-it-yourself guide to step-by-step tips & tricks is designed to help anyone from beginner to expert improve every aspect of their day-to-day computing. (148 pages)

USING OFFICE 2000
This all-in-one reference guide allows you to accomplish anything with Word, Excel, FrontPage, Publisher, PowerPoint, PhotoDraw ... and much more! (148 pages)



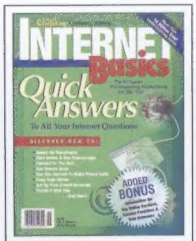
WINDOWS 98 TIPS, TRICKS & TROUBLESHOOTING
Enhance and fine-tune every aspect of your Windows 98 system with these simple step-by-step instructions. (148 pages)

WINDOWS 98
Learn how to install, run, and troubleshoot the newest consumer version of Windows. This issue can make your life in Windows 98 easier much than before. (196 pages)



WIN95 TIPS, TRICKS & TROUBLESHOOTING
After you have learned the basics of Microsoft Windows 95, get this issue for more advanced secrets that will help you master your operating system. (160 pages)

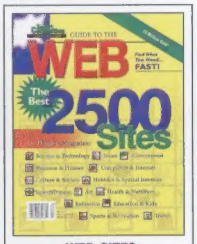
INTERNET TOOLS
The complete guide to **all three top** Internet browsers: ***America Online, Explorer, and Communicator.*** Contains all the tips and tricks you'll need! Plus complete coverage on the best online hardware, software, and Internet service providers. (148 pages)



INTERNET BASICS
This book walks you step-by-step through your first online connection and gives you detailed tutorials on many Internet activities. Also includes hardware and software tips. (148 pages)

INTERNET TIPS & TRICKS
Learn how to do just about anything online. Be your own broker, find cheap airline tickets, find a job, plan vacations, buy a car, or sell a house. Plus hundreds of other time-saving tips. (148 pages)

ENHANCING WEB SITES
Step-by-step instructions that show you how to design, set up, and operate a successful Web site. Plus secrets to promoting your Web site for free. (180 pages)



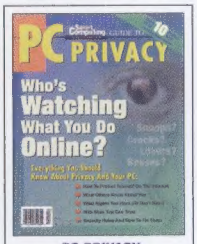
WEB SITES
Discover the best sites for News, Education & Kids, Entertainment, Culture & Society, Arts, Computers & Internet, Sports & Recreation, and Hobbies & Special Interests. (148 pages)

WEB'S BEST BANK & INVESTMENT SITES
Reviews of leading online brokerages. How to start banking online, where to get the best rates on loans and insurance, plus much more. (148 pages)

WEB'S BEST JOB SITES
Use the Internet to find work in any state and in other countries, advance and develop your career, research potential employers, and tons more. (148 pages)

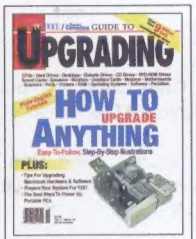
WEB HIDDEN TREASURES
This issue shows you where to find the Web's best bargain products, free services, and discounts. (148 pages)

WEB'S BEST SHOPPING & AUCTION SITES
Where and how to buy or sell anything online. Plus online coupons, discounts, gift certificates, and freebies. This is the ultimate guide to online buying or selling. (148 pages)

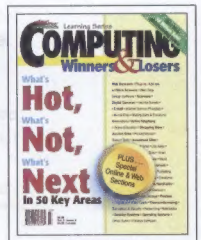


PC PRIVACY
What you should know about privacy and your PC. Topics include: privacy at home and work, encryption, knowing your rights, sites you can trust, sites promoting user privacy, and much more! (148 pages)

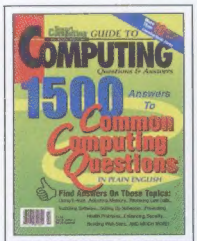
BUYING COMPUTERS
Feb. 2000 - Apr. 2000
A must-have issue before you make your next purchase. Complete reviews and recommendations on hundreds of products. (148 pages)



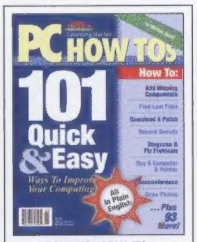
UPGRADING
Whether you're upgrading your CPU, hard drive, or other component, this easy-to-understand, step-by-step guide will show you how. (148 pages)



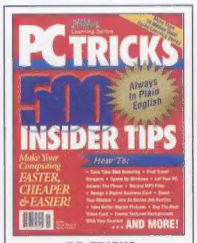
COMPUTING WINNERS & LOSERS
What to look for and what to avoid when making purchasing decisions on hardware, software, ISPs, and much more! Plus the latest info on Web site categories and what they have to offer. (148 pages)



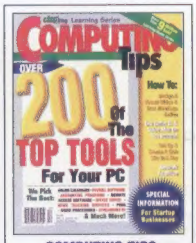
1500 QUESTIONS & ANSWERS
Find Plain-English answers to the most frequently asked computing questions. Topics include: using e-mail, adjusting memory, restoring lost data, installing software, setting up networks, enhancing security, building Web sites, and much more! (148 pages)



101 PC HOW TOs
Find Plain-English solutions to 101 of the most common computing problems. These step-by-step articles will help you troubleshoot, maintain, and customize your hardware, software, and operating system. (148 pages)



PC TRICKS
Get better results from your hardware, software, and the Internet. Including how to: speed up Windows, take better digital pictures, scan images like a pro, record MP3 files, save time Web browsing, create a Web site, shop online, and much more! (148 pages)



COMPUTING TIPS
For Small Business
Turn your business into a technological juggernaut! A complete guide covering everything from the Internet to hardware, software, networking, and much more. (148 pages)

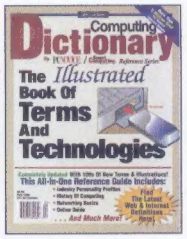
Reference Series by Smart Computing IN PLAIN ENGLISH

Four of the best plain-English resource books available anywhere.

$12.95 each or $6.50 each to *Smart Computing* Subscribers

DICTIONARY

More than 250 pages

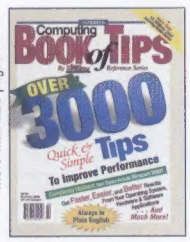


More than 3,000 terms & technologies. Fully illustrated and written in plain English. This reference guide includes manufacturers' addresses, phone numbers, and Web addresses; as well as industry profiles, the history of computing, networking basics, an online guide . . . and a whole lot more.

4th Edition

BOOK OF TIPS

More than 225 pages



Thousands of practical, easy-to-use tips covering every aspect of computing. Get faster, easier, and better results from your operating system, hardware, and software. Inside you'll find more than 3,000 simple tips covering most day-to-day tasks and applications.

3rd Edition

Special Gold Embossed Reference Binders

The perfect way to protect and organize your computing reference library!

These special binders are not only attractive, but heavy duty and durable. Each binder holds 9-12 issues with adjustable metal spines that allow you to easily add or remove issues as necessary. Just $12.95 each

For Credit Card Orders or Subscription Information Please Call (800) 733-3809

In US funds includes GST #BN123482788RT0001

You'll receive your issues within 10 days of receipt of order. *Smart Computing* • P.O. Box 82518 • Lincoln, NE 68501

Hours: Monday - Friday 8 a.m. - 8 p.m. CST • Saturday 8 a.m. - 4 p.m. CST

www.smartcomputing.com

SC453

Now the fastest retriever in cyberspace.

No matter what you're searching for on the Internet, from biographies to body piercing, you'll find it faster and easier when you unleash the new Lycos. All you have to do is log on to the Internet and say, "Lycos, go get it!"

LYCOS

Go Get It!®

w w w . l y c o s . c o m

©1999 Lycos, Inc.